THE

LONDON JOURNAL

OF

Arts and Sciences;

CONTAINING

FULL DESCRIPTIONS OF THE PRINCIPLES AND DETAILS OF

EVERY NEW PATENT,

ALSO

Original Communications

ON SUBJECTS CONNECTED WITH

SCIENCE AND PHILOSOPHY,

PARTICULARLY SUCH AS EMBRACE THE MOST RECENT

INVENTIONS AND DISCOVERIES

IN

Practical Mechanics.

BY W. NEWTON,

CIVIL ENGINEER AND MECHANICAL DRAFTSMAN.

Assisted by several Scientific Gentlemen.

VOL. VI.

[SECOND SERIES.]

London:

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1831.

PREFACE.

In closing the present volume of the London Journal of Arts and Sciences, the Editor avails himself of the opportunity to express his acknowledgments, for the very flattering support which he has continued to receive from a numerous list of subscribers and contributors, during the twelve years that this Journal has been in course of publication; without attempting to claim to himself any merit for the manner in which the literary and graphic departments of the work have been conducted (which the public can best appreciate) he has great confidence in alluding to one peculiar feature embraced in this Journal, which no other publication has ever attempted, viz. a complete ***Repertory of*** **Every** ***New Invention*** that has been made the subject of **Patent Right** since the commencement of the work.

In pursuing this arduous undertaking, it must be obvious that many and considerable difficulties would present themselves in its accomplishment, which have occasionally retarded the publication of some few Inventions, but have never finally excluded any.

From the great increase in the number of Patents granted of late years, it has not been found practicable to bring up all their reports so early as might be wished; but in this and the preceding Journals, constituting Twenty Volumes (including the First Series) the specifications and descriptions of all the new Patent Inventions which have been Inrolled in Chancery, up to the beginning of the year 1828, will be found fully reported, with the graphic illustrations accompanying them, in a series of more than Three hundred plates; and though the *whole* of the specifications and descriptions of the Patent Inventions inrolled in the following years have not yet been reported, nearly Two hundred and fifty subsequent Patents have been described in the pages of the Journal, and those which still remain to be noticed will very shortly appear.

In addition to this important feature—the full explanation of the principles and details of *every new Patent Invention*, a very extensive collection of other scientific information is inserted in the work, constituting the London Journal of Arts and Sciences, a most complete Magazine of Mechanical Art and Journal of its progressive improvements.

METEOROLOGICAL JOURNAL,

For Jan. and Feb. 1831.

1831.	Thermo.		Barometer.		Rain in inches	1831.	Thermo.		Barometer.		Rain in inches.
	Hig.	Low	High.	Low.			Hig.	Low	Hig.	Low.	
Jan. 26	32	21	30,09	30,00		Feb. 12	55	42	30,21	30,18	,05
27	37	20	29,92	29,36		13	49	42	30,16	30,11	,025
28	33	25	29,61	Stat.		14	48	40	30,15	30,13	
29	35	27	29,81	Stat.		15	47	36	30,06	29,90	
30	33	17	29,76	29,72		16	50	35	29,93	29,76	,15
31	34	17	29,68	29,52		17	48	34	30,06	29,82	,05
Feb. 1	35	23	29,16	29,09	S,	18	48	32	30,11	stat.	
2	39	25	29,16	29,13		19	49	32	29,99	29,96	,05
3	37	10	29,36	29.14	.125	20	40	34	29,86	stat.	,125
4	39	34	29,33	29,00	2.	21	43	29	29,98	29,94	
5	39	31	29,83	29,53	,125	22	41	30	30,18	30,01	
6	38	21	29,84	29,60		23	43	28	30,30	30,25	,025
7	51	30	29,66	29,46	,35	24	49	26	30,11	30,01	
8	54	45	29,86	29,82		25	45	39	29,76	29,73	,05
9	62	50	30,05	29,89	,05						
10	57	43	30,15	30,11							
11	55	42	30,18	30,13							

Edmonton. *Charles Henry Adams.*

GENERAL ACCOUNT FOR THE PAST YEAR, 1830.

(Kept at Edmonton.)

Month.	Thermometer. Highest	Thermometer. Lowest	Thermometer. Mean.	Thermometer. Range	Barometer. Highest	Barometer. Lowest	Barometer. Mean.	Barometer. Range	Rain. In Inches	Winds. N	S	E	W	N E	S E	N W	S W
January	43	5	30,14	38	30,52	28,59	30,2221	1,93	1,375	3				16½	2½	5½	3½
February	56	2	33,8	54	30,26	29,36	30,4799	,90	1,55	1	½		5½	6		3	12
March	70	24	45,82	46	30,50	29,36	30,0205	1,14	,225			2½		5	1½	4	18
April	73	19	48,52	54	30.14	29,16	29,7288	,98	2,675			1	1	2	3	3½	19½
May	80	30	55,1	50	30,21	29,34	29,8226	,87	2,6	½		1	2	3½	7½	5	11½
June	76	36	56,76	40	30.06	29,39	29,7456	,67	3,130	3		2½	1½	3½	2	6	11½
July	84	41	63,66	43	30,29	29,41	29,8509	,88	1,4	½	1	1½	1½	2½	3	1	20
August	75	33	59,25	42	30,16	29,36	29,8403	,80	2,65					2	2	7	20
September	69	35	54,4	34	30,28	29,22	29,5203	1,06	3,0	2	1		1			5	21
October	69	27	51,75	42	30,44	29,64	30,1462	,80	,650			1		7	2½	7½	13
November	60	23	44,17	37	30,33	29,08	29,7747	1,25	3,275					2	6	1½	20½
December	49	8,5	35,18	40,5	30,26	28,90	29,5530	1,36	1,325	1		3	1	4½	5½	11½	4½
Year.	84	2	48.21	82	30,52	28,59	29.8930	1,93	23,855	11	2½	12½	13½	54½	35½	60½	175

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I. Thompson's improved Pianoforte; and Hirst's Machine for dressing Woollen Cloth.

II. Taylor's improved Machinery for dressing Flax; and Bush's Apparatus for Printing Calico.

III. Shalder's improved Pumps; Nicholls's Power Lever; Phillips's improved Capstans; Knight's Watchman's Clock; Wright's Window Fastener; and Galloway's Steam Boiler.

IV. Street's Rotatory Steam and Blowing Engine; Knowles's Hop Pole Drawer; and Reid's Power Loom.

V. Prosser's improved Window Sashes; and Pinkus's Gas Apparatus.

VI. Roberts and Upton's improved Lamp; Hancock's Steam Boiler; and Wrench's improved Thermometer.

VII. Wright's improved Wheel Carriages; Gurney's Steam Coach; Oldham's improved Gearing Chain; and Budding's Strap Fastener.

VIII. Bailey's Lace Machinery.

IX. Galloway's Propelling Apparatus; Budding's Mowing Machine; D'Arcy's Steam Engine; and Sowerby's Windlass.

X. Williams's improved Paddles; Braithwait and Ericsson's Apparatus for making Salt.

XI. Cobb's Paper Machine; Crabtree's Propelling Apparatus; Gillet's improved Wheels; and Smith's Door Springs.

XII. Haycraft's improved Steam Engine; Harris's Appartaus for dressing Woollen Yarns and Cloth; Westwood's improved Watch.

XIII. Lawrence and Rudder's Saddle Girth; Chapman's Tram Waggon; Melville's Propelling Apparatus; Spong's Antifriction Apparatus; and Geithner's improved Castor.

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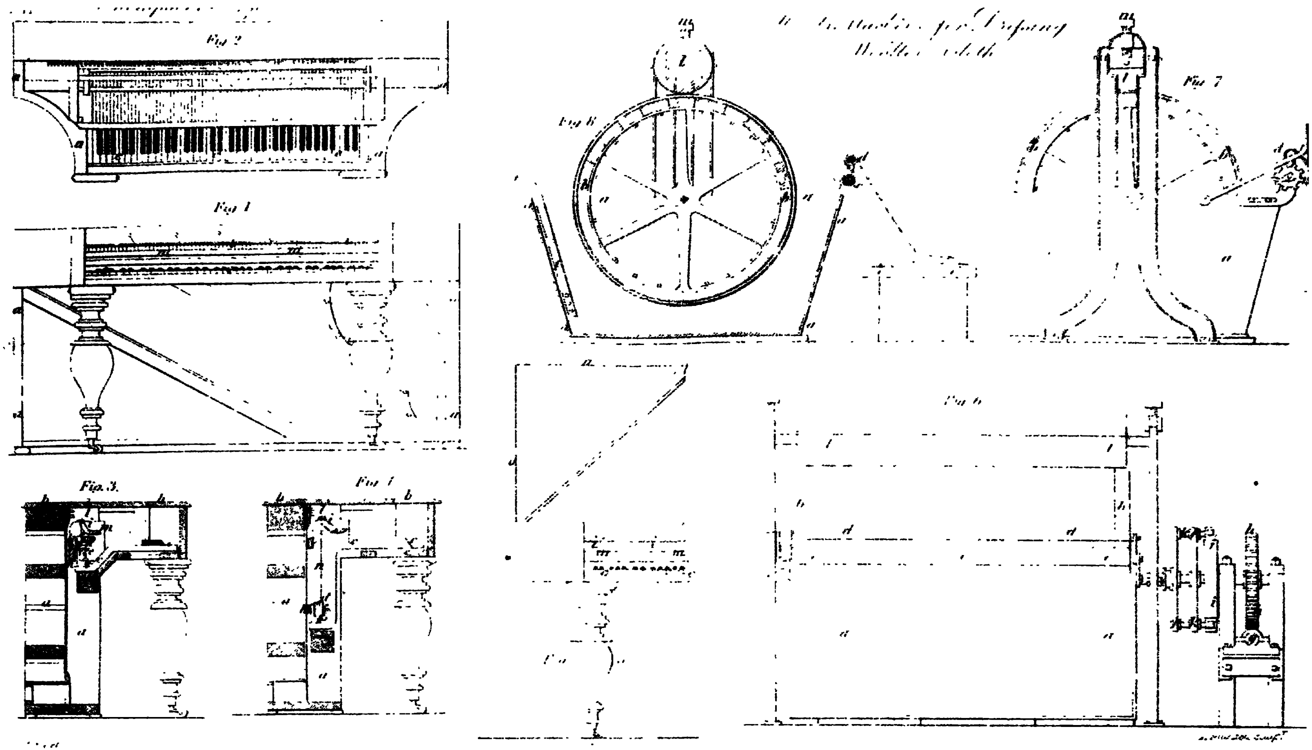


Fig. 2
Fig. 1
Fig. 3.
Fig. 7

THE

London

JOURNAL OF ARTS AND SCIENCES.

No. XXXI.

[SECOND SERIES.]

Recent Patents.

To SIMON THOMPSON, *of Great Yarmouth, in the county of Norfolk, Compass Maker, for his having invented or found out certain improvements in Piano Fortes.*— [Sealed 27th Feb. 1830.]

THE object of the Patentee is to construct Piano Fortes of the upright kind in a more compact form than has heretofore been done, and the improvement which is principally in the form of the key and action part, allows of a new arrangement of the mechanism by which the instrument, though of the upright construction, stands entirely below the face of the performer, and by that means does not impede the free vibration of the voice in singing.

SPECIFICATION.

"My invention of certain improvements in Piano Fortes consists in a new arrangement of the parts of that descrip-

tion of instrument called the *upright piano forte*; by which arrangement I am enabled to construct the instrument much below the usual height, and also to make the top of the piano forte a flat surface, as a table, without any projection above the part which is usually called the lock board. I am also by this arrangement enabled to make a much more simple action of the keys and hammers, for producing tones from the strings of the instrument than has heretofore been used in upright piano fortes, and to allow the sound to escape more freely. The effect of this arrangement is that the tone of my improved instrument sounds much louder than other upright piano fortes; and the common objections made to that construction of instrument, by vocal performers, when accompanying their own voices on an upright piano forte, "that the silk front or face absorbs the voice," is completely obviated. I also have, by varying the mode of stringing the common construction of upright grand piano fortes, been enabled to make a more simple action, and produce louder tones than heretofore has been effected in the usual construction of those instruments. All which improvements are set out in the accompanying drawings (see Plate I.), and will be fully understood by the following description thereof.

"Fig. 1, is a front view of an upright piano, on my improved construction, the top of which is intended to be perfectly flat. Fig. 2, is a horizontal view of the same, but with the lock board removed, exposing the keys, and part of the interior; and fig. 3, is a vertical section, taken transversely through the instrument, about the middle, exhibiting the parts called the action. The similar letters referring to the same respective parts in all those figures.

"As the construction of a piano forte is well known to persons connected with their manufacture, it is unnecessary to enter into a full description of the instrument; I

shall therefore confine myself as much as possible to my improvements thereon; *a, a, a,* is the body of the piano forte containing the strings, sound-board, bridges, &c. and all parts requisite for a complete instrument; *b, b,* is the lock-board, covering the keys which are placed upon the key board or frame, in the usual way. In fig. 3, the shape of the keys *c, c,* will be best seen, which it will be perceived are bent down in order to gain room, and that proper motion may be communicated to the hammer, by the part of the action usually termed the grass-hopper, so as to make it strike at the proper place, on the strings of the instrument; *d,* is the grass-hopper, which acts on an under hammer *e,* hinged on the rail *f*; this hammer *e,* acts upon another hammer *g,* above it, hinged the reverse way on the rail *h,* which hammer *g,* communicates motion to the upper or striking hammer *i,* hinged on the rail *k,* and may have any of the common checks connected to it, to prevent its recoil or re-action on the strings. To the lower hammer *e,* is connected the end of the perpendicular wire or guide rod *l,* which gives motion to a damper of the common construction, fixed over the striking hammer in the usual way; *m,* is the rail that the striking hammer rests against, when out of action.

" Fig. 4, is a transverse section (taken through an instrument in the same direction as fig. 3,) shewing a variation in the arrangement of the parts constituting the action suitable to my improved construction of instrument, but which action has only one under hammer, as in this arrangement the ordinary sticker is employed; *c, c,* is the key bent lower down than in the previously described construction, in order to gain room for the sticker *n,* which acts upon the striking hammer *i,* in the usual way. Fig. 5, is a front view of another instrument intended to be made higher than those above described, or as common upright

piano fortes usually are, to which the the same action may be applied, and with either straight or bent keys. By this arrangement, the parts called the stickers used in upright piano fortes are dispensed with, and all parts of the strings above the dampers left perfectly free of any incumbrance or covering, except the silk front. In this construction the power of applying my improvements is obtained, by the particular mode of stringing the instrument shown in the drawing.

"As I have necessarily shown and described many parts which are not new, to render the arrangement and action of the instrument better understood, I hereby declare that I do not mean or intend to claim as my invention, any of the parts, which are commonly used in the construction of piano fortes; but I do claim as my invention, 1st. The particular arrangement of the parts of the piano forte, and of the action, as shown, and particularly the bent shape of the keys, by which the instrument may be made less lofty than heretofore; which bent shaped keys can also be used to advantage, either in horizontal, square, or grand piano fortes, and by these means those instruments may be built much lower, and yet afford sufficient room for the knees of the performer, and the lock board of a more ornamental shape."—[*Inrolled in the Rolls Chapel Office, Aug.* 1830.]

Specification drawn by Mr. Newton.

To Peter Taylor, *of Hollinwood, in the county of Lancaster, Flax Dresser, being one of the people called Quakers, for his invention of certain improvements in Machinery for heckling, dressing or combing flax, hemp, tow, and other fibrous materials.*—[Sealed 29th March, 1828.]

The subject of this Patent is a machine for heckling or combing flax and hemp, in order to clean it from the

woody particles of the bark which encloses the filamentous parts of the stalk. After breaking the bark by beating, the material is fastened between clamps and placed in the machine, where by a succession of actions of the mechanism, the filaments in passing through the combs or heckles, are separated from the broken parts of the stalk, and rendered clean, and fit for the further operations of spinning. The construction of the machine, and its various parts, are shewn in Plate II.

SPECIFICATION.

"Fig. 1, is a side view of a heckling machine, constructed with my "improvements for the heckling, dressing, or combing of flax, hemp, tow, and other fibrous material;" and these improvements consist of certain arrangements of machinery in which the flax or other fibrous material is submitted to the action of the heckles. These arrangements or parts of machinery, constitute the machine represented at fig. 1.—Fig. 2, is a plan of the same machine. Fig. 3, is a side view seen in the opposite direction to fig. 1, and fig. 4, is an end view of the same machine.

"In describing this machine, I shall divide the action of its different parts into four movements. 1st. The movement by which the strick or portion of flax, is gradually lowered and brought in contact with the hackles. 2ndly. The movement of the heckles. 3rdly. The arrangement of parts or movement by which the heckles are cleared or freed from the tow collected in them; and 4thly, the movement by which the strick of flax is withdrawn from the action of the heckles when finished.

"Figs. 7, 8, 9, 10, 11, 12, 13, represent the different parts of a holder, or clamp, in which the strick of flax is firmly placed, preparatory to taking it to the machine, and

are various views of the same part of the holder or clamp: and it is across this part, that the strick of flax is regularly spread or divided between the projecting screws *a*, *a*, *a*.

"Figs. 11 and 12, are side and end views of a part of the holder or clamp, which fits immediately on to the part 7, receiving the screws *a*, *a*, *a*, *a*, *a*, through the corresponding apertures *b*, *b*, *b*. Fig. 13, represents five nuts, which are then placed on the screws *a*, *a*, *a*, *a*, *a*, in order to hold the parts 7 and 11, firmly together, the strick of flax being first placed between them.

"This part of the operation is performed by boys, or others, whose business it is to supply the machine with flax or other material thus placed in holders or clamps.

"By reference to fig. 4, the position in which the strick of flax is placed, will be seen at the hooks B, B, where one of the holders marked A, is suspended, and from which the flax hangs down in a perpendicular position. In reference to figs. 2, and 4, C, C, are fast and loose pullies, by means of which the machine is driven by a strap or otherwise from any adequate first moving power, and from the fast pulley power is conveyed by means of the shaft D, to the train of wheels E, F, G, H, I, K, (see fig. 3,) and through the perpendicular shaft L, to the bevel wheels M and N, which last is firmly fixed to the shaft or roller O. The roller O, passes across the machine, as seen in plan, fig. 2, and carries the two pinions P, P, which gear into the racks Q, Q, (see figs. 1 and 4,) these racks move freely in a perpendicular direction, being steadied or held by the friction rollers *q*, *q*, *q*, as seen at figs. 1, 3, and 5, and it is by means of the action of the pinion P, P, on the racks Q, Q, that the horizontal bar R, to which they are attached, is gradually lowered along with the holder A, containing the strick of flax: and it is this gradual or progressive lowering, effected by the train

of movements hereinbefore described, which I call the first movement of the machine.

"Opposite and parallel to the roller O, which revolves along with the pinions P, P, is a flat bar S, as seen at fig. 2, placed in an oblique direction, having its lower edge even with the lower surface of the cylinder O, and it is between the edge of the part S, and the cylinder O, that the strick of flax is gradually drawn by the revolving cylinder O, as it is lowered by the bar K, as hereinbefore described. The parts S, and O, also serve to steady or hold firm the strick of flax at the time when the heckle is inserted into it, as described.

"The second movement of this machine, or that by which the heckle is inserted into the strick of flax, and drawn through it for the purpose of dressing or heckling, is effected in the following manner:—T, T, figs. 1 and 2, represent heckles of the ordinary construction, which are firmly fixed or attached to the parts U. On reference to the plan, fig. 2, it will be seen that the parts U, U, with the heckles attached to them, are parallel with the roller O, and the part S, between which the flax is conducted; and also that they are held in this parallel position by the arms V, V, V, V, which arms are connected to cranks on the shafts W, W.

"On referring to fig. 1, it will also be seen that the arms V, V, V, V, are also connected to the cranks, on the lower shaft D, by means of the part X. Now the shafts W, W, and the shafts D, D, are revolved at an equal and regular speed by means of the train of wheels *y*, *y*, *y*, *y*, *y*, *y*, figs. 1 and 2: and it is by the revolution of the cranks placed in the shafts D, D, that the perpendicular or up and down motion of the heckles for the purpose of heckling is effected; at the same time that the horizontal or back and forth motion of the heckles for the purpose of inserting them into the strick of flax at the commencement of

the downward stroke of the heckles, and withdrawing them at the end of the lowest point, is effected by means of the cranks on the shafts w, w.

"Thus supposing the wheels *y*, *y*, *y*, *y*, *y*, *y*, to revolve in the direction of the arrows on the periphery, it will be seen by reference to fig. 1, that the heckle on the lower arm v, is in the act of receding from the strick of flax by means of the crank on the shaft w, to which it is attached, while the upper arm v, with the heckles with which it is connected, is forced forward towards the strick of flax by by means of the cranks on the shaft w. to which it is attached.

"The third movement of this machine, or that by which the heckles are cleared of the tow which accumulates upon them, is effected by a part shewn at fig. 14, in a side view, and in plan, at fig. 15. This part is constructed of thin sheet iron, or other suitable material, and holes being made through the wood of the heckles and the part u, to which they are attached, the rods *c*, *c*, are inserted therein, in the position best seen at fig. 4, whose part of the heckle teeth are omitted for the purpose of shewing the position of part 14 and 15.

"Referring to figs. 1 and 2, the rod *c*, which is attached to the part *c*, by means of a connecting rod *t*, (see fig. 2) passing at the back of the heckle, will be seen connected by a small stud at its opposite end, to the rod *d*, *d*. This rod *d*, is also attached to the lever v, and passes at its lower extremity through the loop or guide *e*; and it will be seen at fig. 1, that when the parts v, and the heckles are at their greatest elevation, or the commencement of the stroke, the clearer is, by the position of the rods *d*, *c*, held back, and placed at the bottom of the heckle pins, leaving them free to enter the flax: but as soon as the heckles arrive at their lowest position, or the end of the stroke, the rods *c*, and

d, become so situated as to force forward the clearer, and deliver the tow from the heckles. The tow thus freed from the heckles is allowed to fall through apertures in the floor, as shewn by dotted lines beneath fig. 1.

The fourth, or last movement of this machine is that by which the bar R, which carries the holders along with the flax, is elevated or raised at the termination of the downward traverse of the racks Q, Q. By reference to figs. 2, 3, and 4, it will be seen that the upper part of the shaft L, is steadied or held by a lever *f*, *f*, which vibrates freely on its fulcrum *g*, and also that there are bevels placed immediately above and below this vibrating lever, the lower one of which gears into the bevel N, and produces the downward motion of the racks Q, Q, as seen in fig. 4, while the upper one marked *m*, runs free; but as soon as the racks Q, Q, and bar R, shall have lowered sufficiently to heckle the whole of the strick, the stop *h*, which is fixed by a set screw on a perpendicular rod, connected and moving along with the rack, strikes a projection *l*, from the forked piece *k*, *k*, *k*, which is vibrated in the direction shewn by dots, at fig. 4; and the end of the lever *f*, *f*, already mentioned, being within the fork of the part *k*, *k*, *k*, is carried in the opposite direction, and the wheels M, and N, thrown out of gear. At the same time, and by the action of the part *k*, *k*, *k*, on the lever *f*, *f*, which throws the wheel M, and N, out of gear, the mitre wheels *m*, and *n*, are thrown into gear. By reference to fig. 6, the parts now being described will be seen on a larger scale, where the same letters are retained to indicate the same parts.

"Attached to the bevel *n*, which runs loose on the shaft O, is a pulley which is acted on by a weight seen at *p*, figs. 3 and 4; by means of the weight, the stop or pin at the back of the pulley, as seen at fig. 6, is held up, and is made con-

stantly to follow a corresponding stop connected with the shaft O, when the bevels *m*, and *n*, are thrown into gear by the downward traverse of the racks Q, Q, by the means already described, the wheel *n*, has to make one entire revolution, before the stop, at the back of the pulley, comes into contact with the opposite side of the corresponding stop, which it has followed by means of the weight *p*, and during the period of the revolution of the wheel *n*, the pinion B, along with the racks Q, Q, remain at rest, thereby allowing time for that part of the strick of flax which is nearest to the holder to be effectually heckled.

" As soon as the bevel *n*, has made one revolution, and brought the pin on the back of the pulley annexed to it, to the position seen in fig. 6, it carries the shaft O, along with it, which acting by means of the pinion P, P, on the rack Q, Q, in the manner already described, elevates it to its former position, when the operation removes the holders, and replaces them by other holders containing a fresh portion to be heckled.

" At this period, or when the racks Q, Q, are at their greatest elevation, the position of the forked piece *k*, is reversed, and again placed as seen at fig. 3, by means of the stop *i*, which acts in a similar manner to the stop *h*, already described, the wheels *m*, and *n*, are thrown out of gear, and the wheels M, and N, are thrown into gear, which, reversing the motion of the pinion B, the progressive lowering of the racks Q, Q, is recommended.

" Fig. 5, represents a side view of a machine similar to that already described, with the exception of the horizontal or back and forth motion, for the purpose of inserting the heckles into the flax, and withdrawing them at the end of the stroke, which is produced by a different arrangement of parts; D, is the driving shaft of the machine, from which the various movements are carried, as already

described, with the exception of the one of which I am about to speak; *r, r,* is a lever vibrating freely on its fulcrum *x*, at the lower part of which is a slot or opening, to admit the projection or pulley attached to the crank *z*. This crank revolving on the same shaft with the wheel *y*, carries or vibrates the lever *r, r,* at every revolution of the wheel *y*. At the lower extremity of the vibrating lever *r, r,* will be seen connecting rods, by which it is attached to the levers 16, 16, which vibrate freely on fulcrums 17, 17, and are attached to the parts v, v, at their upper extremity.

"Now, supposing the wheels *y, y,* to revolve in the direction of the arrows marked in their periphery, it is obvious that the consequent vibration of the lever *r*, would force forward those heckles which are at the greatest elevation, or the commencement of the stroke, at the same time that it recedes or draws back the opposite heckles, which are at the lowest elevation, or the termination of the stroke; and the same effect may be produced by attaching the connecting rods direct to the crank *z*, without the intervention of the lever *r, r,* and by reference to the parts connected with the third movement, or that part of the machine for clearing the heckles of the tow, it will be seen that their action is similar in all respects to that of the machine hereinbefore described.

"Having now described a machine constructed with my improvements in machinery for heckling or dressing hemp, flax, and tow, or other fibrous materials, I do hereby declare, that I do not claim any detached or separate portions or parts of such machinery, such parts or portions being well known, and in common use, but I do claim such combination or arrangement of parts as hereinbefore described, by which the four movements of the machine are effected. And lastly, I do declare, that the

speed of the various parts of my machinery hereinbefore described, as well as the method of producing the same, may be modified and varied, at the pleasure of the party superintending the construction or use of the machine. All which variations and modifications producing the same effects and results may be attained by any person of competent skill, and fit to be entrusted with the construction of machinery of this or a like description.—[*Inrolled in the Inrolment Office, Sept.* 1828.]

To HENRY HIRST, *of Leeds, in the county of York, Clothier, for his having invented certain improvements in manufacturing Woollen Cloth.*—[Sealed Feb. 27, 1830.]

SPECIFICATION.

"MY improvements in manufacturing woollen cloths apply to that part of the process of finishing cloth, where a permanent lustre is given to the face of the cloths, usually by a process called roll boiling, that is stewing the cloth when tightly wound upon a roller in a vessel of hot water or steam.

"As there are many disadvantages attendant upon the operation of roll boiling, such as injuring the cloths by over heating them, which weakens the fibre of the wool, and also changes some colours. I propose to substitute in place of it, a particular mode of acting upon the cloths, by occasional or intermitted immersion in hot water, and also in cold water, which operations may be performed either with or without pressure upon the cloth, as circumstances may require.

"The apparatus which I propose to employ for carrying on my improved process is shewn in the accompanying drawing, (see Plate II.) Fig. 6, is a front view of the apparatus, complete and in working order. Fig. 7, is an end

view of the same; and fig. 8, is a section taken transversely through the middle of the machine, in the direction of fig. 7; *a, a, a,* is a vessel or tank, made of iron or wood, or any other suitable material; I prefer it to be sloping at the back and front and perpendicular at the ends. This tank must be sufficiently large to admit half the diameter of the cylinder or drum *b, b, b,* to be immersed in it, which drum I propose to make about four feet diameter, and about six feet long, or something more than the width of the piece of cloth, intended to be operated upon. This cylinder or drum *b, b,* I construct by combining segments of wood cut radially on their edges, which I secure by screw bolts to the rims of the iron wheels, having arms with an axle passing through the middle.

"The cylinder or drum being thus formed, and rendered smooth, on its periphery, and mounted upon its axle in the tank, I now wind the piece of cloth upon it as tightly as possible, which I do by placing the cloth in a heap upon a stool, as at c, fig. 8; and having passed its end over and between the tension rollers, *d, e,* as shewn, and then secured it to the drum, I draw the cloth progressively from the heap, between the tension rollers, which are confined by a pall and ratchet, or otherwise on to the periphery of the drum, by causing the drum to revolve upon its axis, until the whole piece of cloth is tightly wound upon the drum; when I bind it round with canvas, or other wrappers, to keep it secure.

"If the tank has not been previously charged with clean and pure water, I now fill it nearly to the brim, as shewn at fig. 8, and then opening the stop cock of the pipe *f,* which leads from a boiler, I allow steam to blow through the pipe, and discharge itself at the lower end, by which means I raise the temperature of the water in the tank, to about 170 deg. (Fahrenheit.)

"Before the temperature of the water has got up, I put the drum in slow rotatory motion, in order that the cloth may be uniformly heated throughout, that is I cause the drum to turn, at the rate of about one rotation per minute, and in this manner I continue operating upon the cloth by immersing it in the hot water, and then passing it through the cold air in succession, for the space of about eight hours, which gives the cloth a smooth soft face, the texture not being rendered harsh, or otherwise injured, as is frequently the case by roll boiling.

"The means by which I have found it convenient to give the uniform, rotatory motion to the drum, is shewn in fig. 6, in which *g*, is an endless screw or worm, placed horizontally, and driven by a steam engine, or any other first mover employed in the factory. This endless screw, takes into the teeth of and drives the vertical wheel *h*, upon the axle of which, the coupling box *i, i*, is fixed, and consequently continually revolves with it. At the end of the shaft of the drum, a pair of sliding clutches *k, k*, are mounted, which when projected forward, as shewn by dots in fig. 6, produce the coupling or locking of the drum shaft to the driving wheel, by which the drum is put in motion, but on withdrawing the clutches *k. k*, from the coupling box *i, i*, as in the figure, the drum immediately stands still.

"After operating upon the cloth in the way described, by passing it through hot water, for the space of time required, the hot water is to be withdrawn by a cock at the bottom or otherwise, and cold water introduced into the tank in its stead: in which cold water, the cloth is to be continued turning in the manner above described, for the space of twenty four hours, which will perfectly fix the lustre that the face of the cloth has acquired, by its immersion in the hot water, and leave the pile or nap to the touch, in a soft silky state.

"In the cold water operation, I sometimes employ a heavy pressing roller *l*, which being mounted in slots in the frame or standard, revolves with the large drum, rolling over the back of the cloth as it goes round. This roller may be made to act upon the cloth, with any required pressure, by depressing the screws *m, m*, or by the employment of weighted levers, if that should be thought necessary."—[*Inrolled in the Roll's Chapel Office, August*, 1830.]

Specification drawn by Mr. Newton.

To James Stewart, *of Store-street, Bedford-square, in the county of Middlesex, Piano Forte Maker, for his having invented certain improvements on Piano Fortes, and in the mode of stringing the same.* [Sealed 22d March, 1827.]

There are three features of improvement proposed under this Patent; the two first, consist in certain novelties in the construction and adoption of the dampers of double action Grand Piano Fortes; the last is in the manner of attaching the strings to their pins, on all description of piano fortes.

In the first place it is proposed, instead of bringing the damper wire immediately over the string which is to be acted upon, to place it two semitones or one whole note off. As for instance, if the string to be acted upon is F, then place the wire damper between the string of G and G sharp, and so of the damper wires of all the other strings. The wires of these dampers are to be placed further back in the instrument than usual, in order to leave room for the introduction of a stopper, to prevent the recoil of the hammer after the note has been struck.

The second improvement is taking off the weight of the dampers, to render the touch of the instrument delicate, which is effected by partially raising the damper lever, and only allowing a part of it to bear upon the key.

Third. It is proposed, instead of forming a loop at the end of the string, for the purpose of attaching it to the hitch pin. to fix a very strong hitch pin, and to pass the string round it, bringing the end of the string back again to another tightening pin, and so causing one string to form two unison cords. It is stated that the friction of the string, on the hitch pin, will be sufficient to hold it, and to allow of the string on each side, constituting two cords to be tuned separately.—[*Inrolled in the Inrolment Office, Sept.* 1827.]

To MATTHEW BUSH, *of Dalmonach Printfield, near Bonhill by Dumbarton, North Britain, Calico-printer, for his invention of certain improvements in Machinery or apparatus for printing calico and other fabrics.*— [Sealed 27th March, 1827.]

THE Patentee commences his Specification by describing the ordinary construction of apparatus, by which calicos and other goods of that description are printed in several colours at one operation; *viz.* by means of a machine having a pressing cylinder or top roller, as it is called, mounted on an axle turning in a standard or frame with several engraved or embossed cylinders or printing rollers, placed round in contact with its periphery, each of which cylinders or printing rollers being coloured or inked by ductors and other suitable apparatus, give the separate portions of the pattern in its own particular colour to the sheet of calico or other material passed between the seve-

ral printing rollers and the periphery of the pressing cylinder.

There is, however, the Patentee says a considerable inconvenience in the employment of this apparatus, as the impression upon the calico from one printing cylinder passes on to the next printing cylinder, before the colour of the first impression has become dry or set; and the consequence is, that the colours by that means run together, and produce an imperfect or confused pattern upon the face of the calico under operation.

To remedy this inconvenience is the object of the present invention, which consists in a novel arrangement of the printing apparatus, and the introduction of heated surfaces between each printing roller; by which means, as the calico passes through the machine, the colour of each distinct impression becomes dried upon the calico before another impression is given.

Plate II. fig. 18, is a vertical section of the machine upon the improved construction for printing three colours, in which three distinct pressing cylinders, or top rollers as they are called, are employed, one to each of the printing cylinders or rollers; *a, b, c,* are the three engraved or embossed rollers or cylinders, which give the impressions; *d, e, f,* are the three pressing cylinders, or top rollers; *g,* is the roller on which the calico or other material is rolled, ready to be operated upon. The rollers *a,* and *b,* are engraved on their smooth surface, and the roller *c,* is embossed or carved in relief as type, which give portions of the pattern severally; and in contact with these rollers *a, b,* are the ductor rollers *h, i,* turning in troughs, which supply the colour to the printing rollers. There are also scrapers as usual, which clear off the superfluous colour from the peripheries of these rollers, while the raised or embossed roller *c,* receives its colour from a travelling

felt, which is carried through a colour trough *k*, and over three tension rollers, and passes in contact with the printing roller *c*.

All these rollers have their proper apparatus for adjustment, as in other calico printing machines, and are driven by toothed wheels, affixed to the end of their axles, and also to the axles of the top rollers, or pressing cylinders, which by that means cause them all to revolve simultaneously, and to bring the several parts of the pattern to fit together, called *registering*.

The calico now being drawn off its roller *g*, is passed under a tension roller, and brought between the printing roller *a*, and its pressing roller *d*, which causes that portion of the pattern, engraved upon the roller *a*, to be printed upon it in one colour. Proceeding onward the calico next passes between the second pair of rollers *b*, and *e*, and another portion of the pattern is printed as in the former, but in a different colour, and proceeding still further, the calico passses next between the rollers *c*, and *f*, which gives the finishing portions of the pattern.

It has been before said that a great inconvenience is felt by the moist colour of a second impression coming upon those parts of the first impression which are not yet dry; to obviate this, metal boxes *l*, and *m*, are attached to the frame of the machine between the pressing rollers, which boxes are intended to be heated by steam, in order that the colours upon the calico may be dried as it passes from one printing roller to the next. There are also endless blankets or felts passed over each of the pressing cylinders, to prevent the colours being mixed.

The employment of the steam boxes for drying the colours between each impression, forms a leading feature of the invention; and similar steam boxes *n*, *n*, *n*, *n*, *n*, *n*, are placed above to dry the endless blankets.

This mode of drying the colours upon the calico between every impression, is no doubt both convenient and efficacious; but with the exception of the particular arrangement of the parts of the machine, we see no feature of novelty, for by reference to the Specification of a Patent, granted to Doctor Church,* dated 18th Feb. 1823 (see Vol. VII. of our First Series, p. 57, and Plate VII), we perceive that boxes heated by steam, or hot air introduced between three printing rollers, form part of the subject of his invention for printing calico and other fabrics in several colours.

A second feature of the present invention is a mode of distending the calico or other material evenly upon a table, so as to enable it to be printed by blocks, and cause the pattern to register with great accuracy. Fig. 19, is a side view of a table for block printing. Fig. 20, is an end view of the same; *a, a,* is the flat part of the table, formed by thick planks, or of stone, in the usual way; its upper surface is covered with blanketing or felt, which forms the bed, to receive the calico or other material about to be printed; *b,* is the piece roll from whence the end of calico is to be drawn over a roller *c,* on to the table. This piece roll is held by a ratchet and click, in order to keep the calico tight.

After passing the calico over the table lengthwise, it is conducted under tension rollers, for the purpose of drying it, and it is ultimately received on to the roller *d,* where it is rolled up.

The novel features of this apparatus are the means which are employed for drawing up the sheet of calico tight and even, supposing it to have shrunk by dying, in order to bring the different parts of the ground pattern into such situations as shall enable the blocks to be placed

upon the table in the ordinary way, to print the finishing parts of the pattern with accurate register.

For this purpose, the calico being drawn tightly over the table lengthwise, it may be strained yet tighter by means of sliding pieces or rails *e*, and *f*, at each end of the table, which pieces, or rails, have straight edges, intended to be pressed down upon the calico, and when it so happens that one side of the calico requires to be drawn tighter than the other, to bring the pattern square, then these straight edges may be depressed more at one side than the other, so as to produce a greater degree of tension.

These rails are held by spring catches in the sliding parts, which prevent their rising until liberated by the thumb of the workman.

The lateral tension is produced by two strips of metal turning over on hinge joints, which have points in them, seen best in the end view, fig. 20; *g*, is one of the strips of metal with its points, which being turned over upon its hinges, causes the points to take hold of the edge or selvage of the calico. The strip *h*, on the other side is turned over in like manner, and when its points have taken hold oft he selvage of calico, the strip is drawn back on sliding pieces, in which it is mounted, until the calico is extended to its proper dimension in a cross direction.

In order that the distension of the material under operation, may be rendered perfectly accurate, so as to fit the pattern on the block which is to finish it, there are register points, placed upon bars crossing the table at *i*, *i*, which being properly fixed to suit any particular pattern, the calico or whatever material is operated upon, is drawn up by the tension apparatus above described, until the certain parts of it meet the register points, when it is ready to

receive the printing blocks by which the pattern is to be completed.

When one length of the calico has been thus printed, the tension is taken off, and it is drawn forward over the series of rollers *k, k, k, k,* which by exposing the surface of the fabric, allows of that colour drying, before it is ultimately wound upon the roller *d.* Another length of the calico is now brought on to the table, and after being strained, is printed by blocks in like manner.—[*Inrolled in the Inrolment Office, September,* 1827.]

To JOSEPH JONES, *of Amlwch, in the county of Anglesea, North Wales, Gentleman, for his invention of an improvement, in certain parts of the process of smelting or obtaining Metallic Copper, from Copper Ore.*—[Sealed 16th July, 1828.]

THIS improvement is designed to assist the fusion of the metal contained in copper ore, and comes into operation after the ore has been brought into that state called regulus or coarse metal.

Regulus, the Patentee considers contains sulphuret of copper, with sulphuret of iron, and in order to cause the copper to run more readily he proposes to mix the regulus with a portion of copper ore that is free from sulphur; which, if not pure in its natural state, must be rendered so by calcination. The pure metal acts as a flux to the copper ore, and the iron then flows on the top, which may be taken off by skimming, or drawn away at the tap hole.

The quantity of copper ore required, will depend upon the state of the regulus, which will be readily found, and this process being repeated several times, will considerably expedite the operation of smelting.—[*Inrolled in the Inrolment Office, January,* 1824.]

To William Grisenthwaite, *of the town of Nottingham. Esq. for a new process of making sulphate of Magnesia, commonly called Epsom Salts.*—[Sealed 11th August, 1828.]

This new process by which Epsom Salts are to be produced, is by mixing together magnesia, sulphate of lime, or plaster of Paris, with carbonic acid and water, which will form a sulphate of magnesia.

The magnesia is to be obtained either by precipitation from sea water, or by the common earthy precipitations, or from the magnesian lime stone. The same modes of evaporation and crystallization, are to be employed, as are usually practiced by chemists.

The Patentee claims to be the first, who has used sulphate of lime, and carbonic acid, for the production of the above salt.—[*Inrolled in the Inrolment Office, February,* 1829.]

To George Pocock, *of Bristol, Gentleman, for his invention of improvements in making or constructing Globes for astronomical, geographical, and other purposes.*—[Sealed 4th February, 1830.

The subject of this Patent is the invention of delineating upon the external surface of a paper balloon, distended with common air, the outlines of the different continents, islands, rivers, and seas on the surface of the earth, which is called an improved construction of globe for astronomical purposes.

Looking at this apparatus as a scientific instrument, it is impossible to consider it with gravity; we do not

mean from the lightness of the paper when inflated, but from the gross absurdity of employing a globe of such flexile & insubstantial materials to determine my geographical or astronomical problem as to distance, space, or time.

The patent globes (such as we have seen) are made by pasting together a series of gores of thin paper, on which has been printed, by lythography, a very rude map of the earth; this, when perfectly joined together, is to be blown out as a globular balloon of about four feet diameter, and a tape with degrees corresponding to the circumference of the globe is provided, to be stretched over it as a quadrant of altitude, or as a meridian, by which the problems are to be worked, as upon the ordinary construction of artificial globes; but with the exception that they are firmly mounted, while the improved globe is intended to be rolled about that floor, bending in every direction out of its spherical figure.

When not in use, the globe may be folded up and carried in the pocket, and when required to be used, it may be distended by passing it to and fro a few times in the air, until it becomes filled, for which purpose a button is affixed in the place of the north pole, and an opening made in the paper at the south. But as this mode of filling the globe may be found inconvenient, there is a wind box provided if required, to which the south part of the globe may be attached. This box acts as a stand, and the globe is filled from below by bellows.

It is suggested that these globes may be distended by wire or cane hoops within, but then of course they cannot be very conveniently rendered portable.

It is also proposed to construct some of those paper globes, so that they may be suspended by the North Pole, bearing upon a point, beneath like a vase, and to turn round upon this point, by the rarifaction of air, heated by

a lamp within, which also will shew the globe transparently, and have a pretty effect. Lastly, it is recommended as a feature of some importance, that the paper of which the globe is constructed shall be made of Irish linen, in order that it may be less likely to tear.—[*Inrolled in the Inrolment Office, April,* 1830.]

AMERICAN PATENTS.

For an Improvement in forming the Nap upon Woollen Cloths, to Zachariah Allen.

THIS improvement consists in extending the cloth, upon which it may be required to raise a nap, very smoothly and firmly over a solid arbor, or edge, and in causing the wires, or cards, set in a cylinder, to act only upon that portion of the cloth which is passing in actual contact around, or over, the solid arbor or edge ; thus bringing the wires to act by a gauge or screw with accuracy and certainty upon all parts of the face of the cloth, and at the same time to penetrate no farther or deeper into the texture of the fabric, than may be found proper to raise a nap without injuring the texture of the cloth.

The improvement herein claimed consists in causing the wires to act upon a portion of the surface of the cloth extended smoothly over a solid body, so that every part of the cloth, thus extended on a hard surface or solid body, may be brought under the action of the wires without a possibility of retracting therefrom, or bagging in the looser parts, and without having some portions of it more intensely acted upon than others, whereby the nap is not only unequally raised, but the cloth itself is subject to be chafed through and damaged, as is the case when it is attempted to raise a nap otherwise than when extended upon a hard, smooth surface or cushion.

For a composition called Leather Paper, to Ephraim F. and Thomas Blank.

This new and valuable invention or discovery, consists of the art of making a paper from the refuse parings or shavings of leather, which is peculiarly and admirably fitted for sheathing vessels; and which is believed to be superior to the sheathing paper, or leather, both of which are now in general use for that purpose. It may also (after suitable preparation,) be used for the most of the purposes to which leather is applied, as the manufacture of patent leather, caps, pocket books, and for all kinds of book-binding.

The mode of forming the patent leather paper, is similar to that of the manufacture of paper from rags. The shavings been ground, or beaten to a proper consistence, are put into a suitable mould, from whence they are taken to the press. The colour of this paper may be varied according to the quality of the shavings used, or by a chemical process. It may be brought to such a degree of fineness and whiteness as to be equal to the finest writing paper.

The subssribers claim the sole privilege of using their patent leather paper in the manufacture of any article to which leather or paper is applied.

For preparing straw, hay, or other vegetable substances for the manufacture of paper. Granted to William Magaw.

The following endorsement has been made upon the specification at the patent office.

"Improvement in the manufacture of paper, for which

two pentents have been granted to the said William Magaw, one dated on the 8th day of March, 1828, the other the 21st day of May, in the same year; both of which patents being hereby cancelled on account of defective specifications." The new specifications is as follows.

This improvement or discovery consists in the use of ley and its salts, in preparing straw, hay, or other vegetable substance, for the manufacture of paper, in the following manner, viz. To one hundred and twenty pounds of straw, or hay, take the ley procured from three or four bushels of ashes, or from fifteen to twenty pounds of the salts of ley, according to the quality; dilute it with a sufficiency of water to boil the straw or hay, which need not be all immersed at the commencement, as it will sink during the process of boiling. Boil the materials together until the vegetable matter and the knots become soft, or pulpy; or steep the materials in the solution several days until the same effect is produced; draw off the remaining liquid and rinse the materials to cleanse them from any dirt, or sediment, then grind them in the usual way, to be manufactured like rags into paper.

The petitioner claims as his exclusive improvment or discovery, the use of the ley, and its salts, and the mode of preparing the materials so as to render them fit for the manufacture of paper.

For certain improvements in the process of finishing Woollen Cloths. To Zachariah Allen.

This improvement consists in laying the folds of woollen cloths smoothly between metallic plates, and in this state immersing the cloth in steam or heated water, and in

subjecting the cloth, while thus immersed, in steam or hot water, to a heavy pressure, by means of a screw or otherwise. After remaining for a short time in this state, the cloth is allowed to become cold, or may be suddenly cooled by cold water, when it is to be withdrawn from the press. The cloth is then to be again folded in such a manner that those portions of the edges of the folds which were not subjected to pressure in the first instance, may be exposed to pressure in the second operation, which is to be completed in the same manner as the first. To prevent any marks or impressions upon the cloth, from the edges of the plates, the cloth may be laid in folds of its full width, and made to extend together with the edges of the plates of metal by means of thin boards introduced between them, and of less superficial dimensions than the plates.

LIVERPOOL & MANCHESTER RAIL ROAD.

The new line of road between Liverpool and Manchester is now complete, and open to the public for the conveyance of goods and passengers. In a mercantile point of view, this work is of great importance to the towns with which it communicates, and also the country round for many miles; but as a *novel work of art*, there is nothing which particularly claims our notice. The same means have been resorted to, and the same description of apparatus employed, which have been before proved in other parts of the kingdom. We subjoin a sketch of the history of this undertaking, which, like many other great works, has been nurtured into maturity by foster-fathers, leaving the real parent in forgetfulness.

The first idea of this undertaking originated as early as 1822, with Mr. William James, of London, a respectable surveyor, who, having witnessed the powers of the locomotive engines in the neighbourhood of Newcastle-upon-Tyne, conceived that they might be successfully employed on a railway for commercial purposes.

The insufficiency of the existing modes of conveyance for the increased commerce of Liverpool and Manchester, and the monopoly enjoyed by the three great canal interests,—namely, the Duke of Bridgewater's, the Mersey and Irwell, and the Leeds and Liverpool Canals, induced several spirited gentlemen to patronize the scheme. Surveys of a line were accordingly made by Mr. James, but principally at his own expense. Mr. James's line presented many advantages, but it was not thought proper to adopt it; and accordingly another survey of a line to the north of Mr. James's was made in 1824 by Mr. Stephenson, and a bill brought into Parliament in the following session; a prospectus was issued, setting forth the superiority of rail-roads over every other communication, describing the direction and nature of the line, which was estimated to cost 400,000*l.*, pointing out the disadvantages of the existing modes of conveyance, and the immediate benefits likely to accrue to the proprietors and to the country at large by the introduction of the locomotive engine, which was represented as a machine capable of developing the most extraordinary powers.

Such, then, was the scheme of the Liverpool and Manchester Railway, requiring, however, the sanction of the legislature before it could be carried into effect. The bill met with the most strenuous opposition, every clause was disputed, when, after a discussion of thirty-seven days in the committee of the House of Commons, it was

thrown out, in consequence of errors in the sections and survey.

Undaunted by this failure, the directors assembled their friends, discussed the objections, and finally determined upon applying once more to Parliament. Accordingly, early in July 1825, Messrs George and John Rennie were applied to; and the former of these gentlemen undertook the survey. On the 12th of August, the committee, on the recommendation of the engineers, determined to adopt a new line of way, passing considerably to the south of the former route.

In furtherance of this resolution, Mr. Charles Vignoles on behalf of Messrs. Rennie, was appointed to prepare the nesessary sections and plans of the projected undertaking. Mr. Vignoles executed his task with much ability, and such was the activity employed by these gentlemen, that the levels and sections of the two former lines, together with every requisite information, relative to the new line, were completed and deposited in little better than three months.

The directors then issued a second prospectus, adverting to the causes which led to the unsuccessful termination of their former efforts, acknowledging the errors that had been committed in the sections and levels, and that to avoid all chance of similar complaints in future, they had engaged the services of Messrs. Rennie, whose combined efforts, justified the fullest assurance, not only of the correctness of the plans and sections, but that the whole line was to be laid down with that skill and conformity with the rules of mechanical science, which would equally challenge approbation, whether considered as a national undertaking of great public utility, or as a magnificent specimen of art.

The second objection to the measure, was the interruption and inconvenience anticipated from the line of road

crossing various streets in Liverpool and Manchester. This difficulty was completely obviated by the new line recommended by Messrs. Rennie, which entered Liverpool by means of a tunnel and inclined plane, thus effecting a direct and most desirable communication with the King's and Queen's Docks. Various other advantages were pointed out by the new line, and as many objections had been made to the employment of loco-motive engines, the clause for using them was abandoned for the time, and every possible sacrifice, consistent with the furtherance of this great scheme, was made. In March, 1826, the measure was discussed with much opposition in a Committee of the House of Commons, and carried by a majority of 47. In the committee of the House of Lords, the opposition was again renewed, but the measure was finally carried by a majority of 28. Such is a brief outline of the parliamentary proceedings on the Liverpool and Manchester Railway, a measure which called into activity very powerful and conflicting interests.

The directors having thus (through the instrumentality of Messrs. Rennie) concluded their labours, it was natural to suppose that the execution of the undertaking would have been entrusted to them. The directors thought otherwise: the whole was most unaccountably taken out of their hands, and instead of being confided to Mr. James, the original projector, was again transferred to the hands of Mr. Stephenson.

This transaction excited the astonishment and disgust of many of the proprietors, some of whom withdrew from the direction, and others sold their shares. But the line had already been fixed by Parliament, and although some slight deviations, which could not be accomplished in the first instance, were afterwards made, the general plan of the undertaking, including the tunnel under the town of Liverpool, the cuttings and embankments in different parts

of the line, the great viaduct over the Sankey Valley, the road over Chat Moss, together with the bridges both over and under the railway, are, with a few exceptions, Messrs. Rennie's, and although attempts have been unjustly made to suppress the names of these gentlemen from all participation in this great work, the transaction is well known and duly appreciated by a large proportion of the public.

REPORT

Of the Select Commitee of the House of Commons on the Laws of Patents.

(Continued from page 297.)

Mr. John Farey called in; and examined.

Do you conceive the protection by a patent right is calculated to render new inventions more generally known and used?—Decidedly so; and particularly to give them every chance of attaining that perfection without which they cannot be brought into profitable use. It is not often that any individual has so much want of a new invention or improvement for his own use that it is worth his giving the requisite skill, time and money to bring it to bear, even if he has the means, and if he could not get some premium for allowing others to use it when perfected, or else keep it to himself to protect himself from competition, he would commonly remain a loser. Very large manufacturing establishments have a great advantage in that respect, because it costs them less to bring inventions to bear, and the profit from their own subsequent use is greater; and hence they do not care much about patents for small improvements; but such a protection, or at least the expectation of it, is essential to the establishment of great inventions in use.

Do you believe that many useful inventions would never have been prosecuted to the public advantage if they had not originally been worked under a monopoly?—By a monopoly I understand a confinement of trade in the hands of an individual; but if licences are granted under a patent, I think there is very little harm can be done by any patent right, for it makes no restriction, but only levies a small tax on a new and profitable

business, which can certainly bear that tax, or else it could not be levied. I am of opinion that many great inventions would never have been brought to bear as they have been, but for the encouragement offered by a patent. Mr. Watt's steam engine may be quoted as a great example: at the time Mr. Watt made his invention in his own mind in 1765, he was not a maker of steam engines, and none of the makers at that day had sagacity to see the value of his discovery before he had made an engine, nor would any of them have prosecuted his plan before it was proved, even if he had made them a present of the invention, much more to give him any thing for it; hence he had no means of making any profit from his invention, or any prospect of repayment for the great expense and labour necessary to bring it to bear in practice, unless he could have secured it to himself for a long term. Mr. Watt at the time he took out his patent in 1769, was a man of known talent, rising into business as a civil engineer; I have letters from him to Mr. Smeaton, and the answers, in which I find Mr. Smeaton considered him as acting most imprudently in quitting his proper professional pursuits to follow up this new invention, of which Mr. Smeaton had nevertheless a very good opinion as a philosophical discovery, but he considered that the difficulties of executing it with such perfection as to be fit for common use, would prove so insuperable that Mr. Watt would only ruin himself in the attempt. Under these circumstances it is certain that if Mr. Watt could not have obtained a patent, he would have done nothing further than make a plan, and at most publish his invention as a philosophical discovery, to do himself honour; in that state his engine might have remained till this day without any one useful application of it being made; for no man to this day, has made so much profit by the use of Mr. Watt's steam engine for his own work in any trade, as would have paid the costs of making a first engine and getting it to answer for his own use in real business, suppposing that Mr. Watt had published a complete plan for it; because the difficulties of a first execution are so great, and require talent and labour, as well as money, to overcome them. As it was, the hope of securing the invention to himself by patent, induced Mr. Watt to devote his whole time and his whole attention to bring his invention into use; and according to a phrase in one of his letters "he staked his all upon it." The words are, "I have been tormented with "exceedingly bad health, resulting from the operation of an "anxious mind, the natural consequence of staking every thing "upon the cast of a die; for in that light I look upon every "project that has not received the sanction of repeated success." This was in April 1776, which was eleven years after

he had made the discovery of his principle, and seven years after he had obtained his patent, and during all which time he had devoted himself entirely to the execution; it is not to be supposed, that any one would have gone through all this toil, without being assured of a property in what cost such a man so much to acquire.

The history of Mr. Woolf's invention is very similar, with the difference that Mr. Watt having, through Mr. Boulton, obtained an extension by Act of Parliament, he acquired a large fortune during the prolongation. Whereas Mr. Woolf's patent expired before the actual outlay had been repaid; so that he is left a real loser by his invention. The previous inventors of steam engines, Mr. Savery in 1698, and Mr. Newcomen in 1710, were similar cases; they lost money. I have published a very full history of the origin and progress of the invention of the steam engine, which shows these facts in a striking light; but it is not peculiar to the steam engine, for all important inventions absolutely require the inducement of patent privileges, and which ought to be for longer terms than fourteen years.—The paper-making machinery is another instance; an act of extension was made, but the patent was afterwards set aside at law. The process of smelting iron ore with pit coal, instead of wood fuel, which has proved so important to this nation, is a strong case; the original patentee, Lord Dudley, is mentioned in the Statute of Monopolies, 21 James the First, 1628, but he ruined himself by his attempts to bring that invention to bear; and it was not till more than a century afterwards, that it was successfully practised.

Is it your opinion that many inventions are more quickly brought into general use, in consequence of a patent having been obtained for them, than they would have been if they had been left to themselves without a patent?—In almost all cases it is so, but in some few cases it is not; those are cases where a patent is taken by a manufacturer, to keep an improvement in his own hands, and prevent any others practising it, in competition with him. In all cases, an invention is more speedily brought to perfection under a patent than without, and in most cases it is more speedily brought into general use.

Will you explain the mode in which you conceive a patent operates in giving publicity to, and accelerating the introduction of an invention into general use?—It operates by inducing the manufacturer under a patent to set up workshops, with tools and means to make the new-invented articles in a large way, and with division of labour, consequently they are made better; also to send out travellers, and to advertise, whereby the new-invented articles are pushed into general use, as far as their

merits will admit, which would never happen from the languid and indifferent proceedings of individual workmen, who are engaged in some other trade, but who might now and then try to make the new articles one by one, without setting up proper tools or system, and who would consequently make bad articles, which, being sent out, would tend to bring the invention into disrepute, and thus spoil the market as fast as it was opened. I consider, in general, that the public derive some benefit from many patents for trivial inventions, such as snuffers, stirrups, lamps, cork-screws, and many other articles of domestic use, which can be of no material value to the public, for the use and exercise of the inventions; but by the operation of patents, the making and vending of patent articles (which have merit enough to sell) is multiplied and accumulated into considerable trades, which would never have arisen to any such extent without patents; because no individuals would have devoted themselves to have created such trades, if others could have supplied the demand as freely as themselves when created; but having been cultivated under a patent, and established as distinct trades by interested patentees, such trades continue to be permanent after the expiration of the patents. That is the origin of a number of considerable trades at Birmingham and Sheffield, and in London. They have arisen from the demand created by many trivial articles or inventions, which if they had been manufactured when new, by every individual who might have thought it worth while to try to make a few, would never have been advertised and pushed into use, so as to create an extensive and distant demand; because the new articles first sent out by individual workmen, would be badly made, so as to fail in answering the purpose of the consumer, and the extension of the demand would thus be prevented; whereas a man, manufacturing under the protection of a patent, sets up at first in a large way, with the aid of tools, and establishes a system of subdivision of labour amongst his workmen, and makes a study of every part of the business; he advertises, and sends out travellers with the new articles, pays attention to rectify all complaints, and satisfy all the wishes of consumers, and by inducing shop-keepers and merchants to sell, and to export, establishes a trade. In short, by using every means which an extensive business in one article admits of, and which a divided business in a variety of articles does not admit of, he creates a new trade in making and vending articles, which are too trifling to be of any importance in other points of view.

Every patent is granted for the triple purpose of making, using and vending, the new invention. In what I designate as important inventions, the using of the invention is the greatest

item of its value to the public, the making may be another item, but of less importance, whilst the vending by shopkeepers may be scarcely worth notice; that is the case in steam engines, spinning machinery, gas lights, weaving, ropemaking, &c. But in others which I have called trivial inventions, although the use of them is not worth consideration as a public benefit (being only for individual convenience) yet the trade of making and vending of the new articles may nevertheless, by the operation of a patent, be rendered an object worthy of some encouragement.

For all these reasons I am of opinion, that the operation of some system of patent laws is indispensable to the protection of inventors, and to induce the efficient cultivation of important inventions; it is also favourable to the erection of trades upon trifling inventions. On the other hand, I do not know any instance in which a good patent law could be pernicious, because every patent that is really defective in invention, would work its own cure. Even under our present system, which I think a bad one, all those cases of patents for absurd inventions, which degrade the patent lists, are abortions, which have no operation whatever, except to bring patents in general into contempt. But all that is no great harm, unless we except the abuse of establishing a substantially good, but legally bad, patent right, into a monopoly by collusion.

What do you mean by a bad patent right?—Where a powerful infringer, by discovering some technical objection or flaw in the deeds, finds it in his power to set a meritorious patent aside; and by threatening to do so, and to go to any expense for that object, he obliges the patentee to make a compromise with him, to refuse any more licences, and repress all others who are not aware of the defect; for if the patent appears substantially good, they who are not in the secret, will be afraid of the result of an action, and still more of the expenses of the law; hence the patent can be kept up as a monopoly by terror, for the patentee is frightened into the measures of the powerful infringer, by the threat of exposing the technical defect of his right, and those measures are to frighten all others out of the new trade, by representing the patent to be good in law.

Do not you consider those small patents as capable of being protected by that sort of collusion as any others?—Yes, much more so than important ones, because individuals have less inducement to incur the expense of contesting the patents at law. Manufacturers capable of carrying on a great invention or trade, are not so easily deceived, nor would they be deterred by the expenses of law, but would certainly bring the patent right to trial, even if they did not see any technical flaw, because it

is so generally known that patents are always likely to be overturned, that it would be worth the costs of an action, to have that chance of getting over a patent for a great invention, though not for a small one.

Is not that an argument against the multiplication of patents for trifling inventions?—Yes; the evil of multiplying legal rights is always great.

Especially where they can be supported by fraud rather than by fair law?—Yes; that is the reason why I do not recommend patents to be granted cheaper, unless some other check than the cost, were applied to limit the number of them; and if it were not for the difficulty of distinguishing the merit of inventions beforehand, I should recommend a previous inquiry and selection, and the terms to be made shorter for trifling patents, and longer for more important ones, but I fear such a system would be abused. It should be observed that the collusion above described, is founded solely on the obscurity of the present law, and its technical difficulties, conjoined with the expensive nature of law proceedings on patent rights, and would not happen under a good system.

Persons take out patents occasionally, not for the purpose of using the invention themselves, but of licensing others; did you ever know where licences under a patent were publicly in the market, that a patentee refused to license a particular individual?—In practice I have known it refused at first, but afterwards granted; for a party so refused can always practise the invention without a licence, and the patentee would, I believe, get only nominal damages awarded by any jury from an infringer under such circumstances of unfair partiality in granting licences. Patents are often taken out by rival manufacturers, where there is enmity and ill-will existing between them; and sometimes the great motive of taking a patent is to steal a march upon some individual rival; but it cannot have much effect to refuse licences to such rival, for I believe that in most such cases, if a licence were refused to a party tendering such a fair price for the same, as had been accepted from others, there would be but little chance of a jury awarding real damages against such party for infringement. Even if the patent were ever so good, they would, I think, give only nominal damages in case of manifest ill-will. The costs attendant upon such verdict with nominal damages would be sufficient to suppress future infringements, if the invention were a trivial one, but not if it is an important one.

Have you known any case in which a licence under an established patent having been refused, the parties have proceeded to work?—Yes, I have known some; but I know of no instance

in which an action has been brought into court for such an infringement; for even if the patent has been established by a previous verdict, so as to leave no great chance of overturning it, the counsel for the patentee would advise him, that it was very imprudent to proceed to a trial which might set the patent aside, if it went wrong; but which was not likely to procure damages in the event of success. And in cases of a first trial, where the validity of a patent has not been established by a previous verdict, damages are not usually given, and are rarely asked for; as it is considered to be only a trial of the question of right under the patent.

Is not a licence often refused from a motive of ill-will between manufacturers?—It is so well known that the refusal would be inefficacious, that licences are not often refused now; it might be in former times; when ill-will exists, licences are very rarely asked for, so that a patentee scarcely ever gets an opportunity of refusing them. In general patentees are very eager to grant licences to any one who applies for them at any sort of fair price; because such taking of licences is an acknowledgement of their right, does credit to their patent, and induces others to apply for licences, all those motives would be strengthened if the applicant were a declared enemy.

Is it common for a patentee to license a certain number of the trade, refusing to license more?—That is seldom done, unless his patent becomes doubtful or difficult to maintain; then it is sometimes done.

In the case of the lace trade, was not there an agreement made that only a certain number of persons should be licensed? —In that case no licences were granted originally; but all the practice beyond that by the patentees, was began in infringement; and when those infringers had gone to a great length, and a large number of actions had been entered against them, and one was appointed for trial, a compromise was made, that they should all be licensed, and pay rent, for just so many machines as each had then really at work. The patentees also engaged not to grant any new licences, nor to work more than a certain extent of machinery in their own manufactures; and to prosecute all new infringers, in the most expensive manner. In that case the patentees had an interest to make that agreement and compromise with the infringers; but if they had disliked such a measure ever so much, they must have come into it, in order to avoid the risk of overturning the patent; for two defects were discovered in the specification, which, though very little known, rendered it doubtful, though not certain, whether it could be supported, if those defects had been pleaded.

The property in that patent was divided, and some of the

proprietors were much more interested in restricting the use of the patent to their own manufactories (and as few others as they could) than in licensing under the patent right; another had a larger interest in the patent right, than in any manufactory, and the premium or rent of the licences (which then amounted to 12,000*l.* a year) might have been extended so as to become more important to him, than keeping out others from the manufacture; he had therefore an interest to grant further licences, but that interest was quite over-ruled by the circumstance, that if they had granted any further licences, the whole body of infringers would not have paid any more rent, but would have continued, or renewed, their opposition to the patent, and would have allowed themselves to be brought to trial, one after another, at their common expense, which it was feared would not have failed in the end to have overset the patent.

As the doubtful point in the patent right was not at all known beyond the circle of the combination between the patentees and infringers, there was very little risk of any new infringers doing harm. The substantial merits of the patent were unquestionable, and were proved by proceedings in a trial on another subsequent patent for improvements, which patent was set aside on the ground that it was not a new invention, for that the first patentee was the real inventor, whereby he got that part of his case proved without bringing his own patent into court. The great fault in the specification which was the weak part of his case, was a clerical omission that no persons could find out, unless they went through the making of a machine exactly by the specification. All the early infringers had done so, and had thus found out how to make their peace with the patentee, but of course they kept the secret, and the later ones did not find it out, because they began to infringe, by making improved editions of the machine, and not those described in the specification.

Any persons determined to use that patent invention might, according to your former statement, have used it with impunity as there had been a determination of the patentees to withhold licences from them?—Not with impunity, because of the expenses of a verdict against them with costs; it never came to the test, but it was always my opinion that a jury would not have given real damages against any infringer who was excluded from the trade which others were permitted to practise under licence. But independently of that doubt, the costs that they would have had to pay, under a verdict with only nominal damages, was enough to deter all those who had any desire to work the patent (after the formation of the combination and limitations under licences) from attempting to infringe the patent, when it was so supported by combination and money.

It should be stated that the machines that were licensed at first, were so numerous, and they admitted of being so much improved in their productiveness without departing from the regulations of the combination, that they were made to supply the gradual increase of the market without any great call for new ones; hence those engaged in the combination were satisfied, and remained firm to it, and there was no such very great inducement for new beginners to enter into the trade, as to be worth the expense of a contest at law; and independently of expense, they would not have had much chance of overturning the patent for want of evidence against it, because all those persons were in the combination to support the patent right, who could have given evidence against it, on the omission in the specification, and on the pretext that some part of the invention as specified was not new, although it was acknowledged that the machine itself was quite new.

Was not an attempt made among the manufacturers to limit the number who should use that invention, after the expiration of the patent?—I believe there was such an attempt made, at the expiration of the first patent; the combined manufacturers were to continue to pay a reduced tax to the patentee, who was to keep up the exclusion by the threat of prosecuting new intruders under a second patent for improvements of the original machine; if that measure had succeeded it would have kept up the monopoly for four years longer; but there was such an obvious certainty that the second patent could not, by any contrivance, be brought to bear against the new beginners, that they only laughed at the threat of prosecution under it, and the attempt failed; as did also another subsequent attempt to set up a still more recent patent for improvements, which had been adopted by a part of the trade, but in such a very different mode from what was specified, that the patent could not by any construction be brought to bear against them.

Did you ever know such combinations and collusions to occur in respect to any other patent right?—I have been told that Mr. Arkwright's patents for cotton spinning were managed much in the same way, but it was long before my time; his second patent, dated 1775, was set aside for insufficiency of specification in 1785; I am not aware of the fact, whether he did employ collusion to support his patent previously or not; of course such things are generally kept secret from those not actually engaged in the business. There cannot have been many instances of supporting invalid patents by getting up sham trials between the patentee and his infringers, after a compromise; because the Judges are so acute in observing technical defects in a patent and specification, that they find them

out, even when they are not pleaded by counsel; I believe that verdicts can scarcely ever have been obtained by collusion, unless the defects of the patent have been such as would require evidence to support them, and that the parties could by collusion withhold that evidence.

Would you think it desirable that patentees who grant any licences, should be compellable to grant to the public without distinction?—That compulsion would be so difficult to apply equitably, by any plan that I have thought of, that I am inclined to the opinion that any such compulsion would be abused, and ought not to be enacted. I think it ought to be rendered as much as possible the interest of every inventor, to encourage the unlimited use of his patent, and to lead him to prefer a small tax on an extensive trade, rather than a heavy tax on an exclusive trade, or a trade rendered unusually profitable by exclusion. The present insecurity of patent rights, and the great expense of proceedings, has a strong contrary tendency; because the more persons a patentee licenses (unless he gratifies them by making them a monopoly), the greater number of opponents he provides against himself, to set to work to discover flaws in his patent; and if a large number make a common subscription fund, for expenses, he can scarcely subdue them at law. Whereas, if fewer licences are granted, and the trade is made exclusive, they will readily pay him a high tax, and will assist him to keep up the patent, when it is used to make a monopoly, though they would do every thing they could to overturn it, if it were only used to gather a fair and moderate tax for the inventor.

How could you ascertain what would be a fair price for licence under a patent?—That might be settled by an arbitration for each individual case, but not for a whole trade, or for a long term. The difficulty is, that such fair price must vary continually with the circumstances of trade, the situation of the parties, the number of licences which are actually in exercise at the time, in competition for the supply of the market, the demand in that market, the effect of other inventions or means which spring up after a licence may have been granted, to divide the supply; in short, although the principle of arbitration would settle all these points, the expense of doing so, as often as would be required, would I think be a worse evil than the present law proceedings. It would be like attempting to provide means by law for fixing a fair rent for leasehold houses, or fixing a fair price for wages. All such laws and regulations are premiums for chicanery; knavish jobbers will study, and find out how to evade, or use them to their own purposes; but honest traders who have other occupations, cannot contend with

such men, when armed with coercive laws, and are always losers by regulations which require any thing of discretion, or attention to circumstances, in their application. It is desirable for the public good, that the extension of the practice of new inventions should be made as great as can be; but a power in the patentee to limit the exercise of the invention, is sometimes of use, to protect those who have recently embarked in the new invention, from undue competition, arising from excitement and delusion, which could not last long; his own interest, if he understands it correctly, will commonly lead him right; for it is rarely that the interest of a patentee, if he has a firm patent right, will be different from that of the public in the long run. If he has a patent that is insecure at law, it is his interest to resort to trick and fraud, collusion, combination or monopoly, to keep up his patent if he can. But after all, a patent right, which stands on its own merits, can never do the public any positive injury The case of monopoly, such as the lace trade, (or Arkwright's), could not have been maintained as it was, if the persons who were admitted into the monopoly had not formed a very large majority of all those who had any desire or interest to practise the invention; for if the patent right had been attacked by a stronger body of new infringers, they would have overturned it, if invalid, or if it had on trial proved valid, then the patentee would have found out his own power, and that he might command his own terms, and would no longer have submitted to the combination which restrained him as well as others. Hence I conceive, that the existence of such a monopoly depends upon the circumstance, that the patent is sufficiciently exercised, to very nearly supply the existing demand for its productions. The patent might certainly do more good, if fairly worked than if abused; but it must, in my opinion, always do some good, or it will work its own cure, either by the patent being set aside, or by the patentee becoming sensible that it is worked to less than its maximum of profit to himself.

So long as the public retain free liberty to use all the means that they possessed before the patent, of doing the same thing as is to be done by the patent invention, it is not conceivable to me how they can be losers by the patent for that invention, under any circumstances whatever. If the patentee were absurd enough to lock up his patent invention altogether, the public would lose nothing that they ever possessed. Or if he over-works it, so as to ruin himself, still the public cannot be losers.

If a man is a great manufacturer himself, in the business to which his invention relates, his interest in his own manufactory may be greater than that in granting licences under his patent

to others; but it is evident that such cannot be the case unless he has the means of supplying the public demand for the new article very freely; hence they cannot lose much by the monopoly he establishes. If he permits no competition, he may keep up a high price, but if he carries that too far, he will check his own trade; for he must meet the competition of all those who practise the business in the old way, and he cannot by any means get more than a fair share of what the merit of the new invention entitles him to; the only evil is limiting the practice.

Mr. J. C. Daniell invented a new process to improve the lustre of woollen cloth, by immersing it in hot water, after the pile is set very smooth. The operation was reported to cost not more than a penny a yard; but that it increased the value of different cloths, to the amount of from two to five shillings per yard. That is to say, the same cloth would sell for so much more in the foreign, or any other market, by a penny per yard being expended upon it, in performing the new process.—He is a large manufacturer, and took a patent for the invention. That patent produced a very great revenue to the patentee, whilst his patent lasted; he received, I think at one time, a tax of 2*d*. a yard for licence under the patent; that tax was nothing, worth notice, to those who paid it, when they improved their cloths so much; but it was a greater object to the inventor than the profit that he could derive, by improving all the cloth he could possibly make in his own manufactory, and he had no interest to endeavour to make his patent a monopoly; he still retained that profit, with only a gradual diminution of it, as the practice extended over the whole trade, under the licences he granted, but as he derived a profit of two-pence per yard, (and might have had more if he had insisted on it) upon all the cloth made by others, he had the strongest interest to promote the practice to the very utmost. If he had made a monopoly, and confined the improvement to his own trade, he could not have improved the price of his own cloth, more than from two to five shillings a yard, for then he came in competition with the cloth manufactured with better wool, in the old way, without his process. Now if he had attempted by exclusion to have kept that improvement of from two to five shillings a yard, undiminished by competition, during all the term of his patent, and had even doubled and trebled the extent of his manufactory (which however could not have been done all at once, and would have required a large capital), still he could not have gained anything like so much as by receiving twopence a yard on all that he could get other people to make under licence; in addition to the whole profit of the improved price of all the cloth that he could make himself; taking his

chance for the effect that a competition limited only by that tax could have, to reduce that improved price.

This case of Mr. Daniell's licences may be taken as an example, to consider what would be the result of compelling patentees to grant licences, at a price fixed by arbitration. In fairness arbitrators must in his case have awarded at least eighteen pence or two shillings per yard; when the patentee, from a consideration of his own interest, took two-pence. I am of opinion, from all the experience I have had, that such arbitrations must inevitably fix the price of licences at an average of at least four times greater, than the patentees usually fix for themselves; because if they insisted upon any such prices, it would be refused as an odious tax, which would so limit the adoption of their inventions, as to diminish the total profits of their patents. I am confident it is best to leave patentees full liberty to use their rights as they think best, and the few cases of individual exclusion that might be attempted from ill-will, would be checked by juries giving only nominal damages for infringements. Mr. Daniell's patent was set aside in 1826, under a writ of *scire facias*. A man was brought to prove he had once practised the improvement many years ago, but he did not pretend to have continued the practice, or that it was ever brought into any use. The evidence had a very suspicious air, and if true, did not in any degree prove that the invention was known or in use, to the benefit of the public; but yet it was sufficient to set the patent aside.

Are there not two objects in taking patents, one in which a man intends to keep his invention for his own use, the other in which he offers to others to use under licence?—The greater part of them sustain jointly both characters, and I think it is most desirable that every patentee should be interested in the practice of his invention for some trade of his own, as well as in licensing under the patent; because it gives him greater means of attaining perfection in the practice of the invention, and also accelerates its introduction into use. Mr. Hall, of Basford, invented a process of singing lace net, by drawing it over a flame of gas lights, and thus burning away all the superfluous fibres. I prepared a specification for his patent in 1819; he was not a lace manufacturer or dealer at that time, and he only proposed, at first, to dress the lace made by others; that was during the time that the trade was carried on under the limitation before stated. He asked a higher price for dressing lace, than the combined manufacturers chose to give him, and being united in a body they would not have adopted the new invention at all, if the patentee had not set up a warehouse in London for the sale of his improved lace, which he bought in the raw state, and refined it by his process. The superiority

was thus rendered so apparent that a great public demand for the improved lace was created; whereby the lace manufacturers, after much scrutiny of the patent, were compelled to send their goods to the patentee, who, as his trade increased, granted licences to others to dress lace. Many infringements on his patent were began, but his specification and patent proved good at law, so that he established and preserved his right.

Ought not the public, in case of the right being sold, to be enabled to come in generally?—It is very desirable that they should; and in a majority of cases it will be the interest of the patentee, if he has the power in his own hands, to get his invention into very general use; but it frequently happens, that in a trade where there are individuals of large property, to whom the expense of law proceedings is not of great consequence, they will endeavour to combine together, in order to induce the patentee by the offer of an addition to his tax for their licences (or to compel him by threatening to dispute his patent right), to limit the exercise of the patent to themselves, and debar poor men from any participation in it. I have explained before, if that the patent is at all doubtful, the patentee will be obliged to come into their measures, and then the combination may repress further infringements by the fear of the expenses of prosecutions, even where there is a probability that such prosecutions under the patent would fail.

Whom do you mean by rich men?—Manufacturers who have adopted the new invention unwillingly, because they foresee that if they do not, others, their competitors, will do so, and gain an advantage. They generally begin as infringers, but if the patent appears at all likely on the face of it to bear a trial, they combine together, either to oppose the patentee, or to take licences and combine with him, according as he either persists in granting more licences, or agrees to make a monopoly for them, whereby they become in effect joint patentees; sometimes the most powerful of such individuals pay for the licences they take, and sometimes they do not, or only a trifle, if their means of resisting the patentee and overturning the patent are strong; the less powerful ones are always made to pay.

Having stated the evil, have you any remedy to propose?—The evil arises entirely from the great expenses of law proceedings, and the uncertainty of the result.

Would you propose that it should be compulsory on parties to grant licences?—I am not prepared to say that, because, as I have before stated, that there would be so much difficulty in fixing a suitable price, and also because I think that the interests of patentees will generally be that which is desirable for

the public, and any administration of such a principle of compulsory sale would be full of difficulty. In most of the cases I have instanced, if the patent had been known to be capable of resisting all attacks at law, the patentee never would have suffered these participations in his rights, for it is always by a sacrifice of his interests, as a patentee, that the combination is formed. When a powerful infringer, who could scarcely be subdued with the present defective law, will assist the patentee, instead of opposing him, it is worth giving him a share in the patent, to bring the power he possesses to support the right, instead of destroy it. I have before stated to the Committee, that patents for inventions relating to naval or military affairs, which may be required for the King's service, often had a clause to compel the patentee to supply all that might be wanted for the King, at reasonable prices; how the price was regulated I do not know; but I once knew a patentee, during the war, who complained of injustice; he told me that after he had set up a manufactory to supply Government with the patent articles, they set up a larger manufactory of their own, with his patent machines, and all his own remained idle. There was a dispute some years ago between a patentee for barrels, for the safe keeping of gunpowder on board ships, and some officers in the dock yards, for infringement of the patent; in the proceedings before the Lord Chancellor, he declared that he should make no distinction between officers acting in the King's service, and any private individuals who might have infringed; but then, I suppose, there was no such clause in that patent.

Would not licences very often be given, though the patent is unquestionably good?—Almost invariably; the circumstances will be very peculiar when, under a patent known to be good, it will be the interest of the patentee to keep it to himself, and a few others, for their own use, rather than to have it generally practised under licences; there are some exceptions to that, but they are not very common; they are all cases in which the new invention produces a new article of commerce, and is not merely a new process for producing an old article; the consequence of this distinction is, that those who practise the patent invention have no competitors who can bring the same goods into the market, without the patent invention; hence, if the patent can be made into a close monopoly, it will command the whole supply of that market, and can consequently be made to raise the price very greatly. Such were the circumstances under which Arkwright's spinning, and the lace trade, originated. It must not be forgotten in all such cases that the inventors of entire new branches of trade, do great service to the public, even if they do charge the very utmost price for the new goods; they

cannot get more than they are worth, for no one would buy if they asked too much, and if they limit the supply, in order to make a scarcity, the public may do without the new articles as well as they did before they were invented; as I said before, the public cannot be injured in any way, though they may be more benefited one way than another; and yet I think it will be found, on consideration, that the interest of the patentee will usually be, to benefit the public as much as can be done by the new invention.

[To be continued.]

List of Patents,

Granted by the French Government between the 1*st of April and* 30*th of June*, 1830.

To Alexandre Louis Firman Boisacq and Antonio Marchand Delevingue, merchants, Lille, for an economical mode of heating steam-engines. 5 years.

— M. le Comte du Bourg, Lille, for a method of grinding all sorts of grain after the system of Councillor Mullevz, of Warsaw. 15 years.

— Josué Heilmam, merchant, Mulhausen, for a loom for weaving vertically. 10 years.

— Pierre Laborde, locksmith and mecanician, Paris, for an horizontal hydraulic engine, acting under water. 15 years.

— Adrien-Havier Martin, active partner in the beet-root sugar manufactory, at Rochincourt, in the department of the Pas de Calais, for a new method of making native raw sugar. 5 years.

— Pierre Pradel, clock-maker, Carcassonne, Aude, for a new invented wool-carder, for dressing cloth. 5 years.

— Jean Ardouin, gunsmith, of La Rochelle, for a method of charging fire arms by the breech. 5 years.

— Jacques Cail, tinman and brazier, Chaillot, near Paris, for an apparatus for distilling by steam. 5 years.

— Pierre Cartereau, brick-maker, Sarcelles, for a machine for making bricks, tiles, square tiles, &c. 15 years.

— Pierre Chouard, plaster manufacturer, Bercy, near Paris, for a permanent kiln for baking the lime previous to reducing it to plaster. 15 years.

— Aimé Duvergier and Hilarion Bordege, engineers, for an apparatus for turning water and other fluids to steam. 15 years.

To Galy Cazalat, professor of natural philosophy, Versailles, for an acrostatic lamp for lighting by means of pure water, air, and oil. 10 years.

— Garcon Malar, Paris, for a cylindrical mill. 15 years.

— Jean Gustave Grucker, bookseller, and Thiebault Antoine Schott, instrument maker, Strasbourg, for a new musical instrument, called the " Physharmonica." 5 years.

— Manteau and Deverte, Paris, mechanics, for a drawing machine. 15 years.

— Jean Louis Pichonnier, cutler, Paris, for an improved pen-cutter. 5 years.

— Perpigna, Paris, for a machine for evaporating syrups and other liquids suceptible of receiving injury from being too long exposed to the heat. 10 years.

— Quatresols de Marolles, Sepville, Provins, for a method of making bricks, tiles, and square tiles by machinery. 15 years.

— Jean-Louis Robert, Paris, for a castor or roller of a new composition, adapted to all kinds of domestic uses. 5 years.

— Pierre Augustin Santreuil, Fecamp, for various machinery, called " Machines Fecampoises," for the use of carpenters and joiners in making floors, wainscots, mouldings, cornices, window sashes, &c. 15 years.

— Pierre-Fourrier-Just Silvestre, musical instrument maker, Mirecourt, for a newly invented organ, called the " Kallistorganon." 10 years.

— Wall Stacs, secretary to the Mayor of Steenwerck, on the department du Nord, for a desk or bureau, which may be raised at pleasure. 5 years.

— Claude Chrétien and Louis Charles Sourd, silk stuff manufacturers, Lyons, for a machine for making ribbon and plain broad stuffs. 5 years.

— Jean Gustave Deleuze, jeweller, Paris, for a new invented button for fastening shirt collars, wrist bands, &c.

— Jacques-Louis Elesban-Mariton, Paris, for a sugar grater. 5 years.

— Jean François Nicolas Goulet-Collet, manufacturer, Rheims, for a new invented sounding lead. 5 years.

— Louis François Labbé, Nantes, for a machine for eradicating corns and bunnions, without the use of any cutting instrument of iron or steel. 5 years.

— Oudinot-Lutel, merchant, Paris for a horse hair stuff for making dresses, &c. 10 years.

— Pelletan, professor of natural philosophy, Paris, for a system of steam navigation, by machinery, the whole of which is below the surface of the water. 15 years.

To Louis Auguste Richard, Saint Chamond, for the invention of "Vocotypographic," or the art of printing by the means of 40 moveable characters, with their appurtenances, &c. 5 years.

— Benoit Roca, Montferrer, for a plough. 5 years.

— Nicolas-Joseph Schwabel, mechanic, Strasbourg; for a machine for cutting up raw tallow. 5 years.

— Pierre François Toussaint, locksmith and mechanic, Paris, for a lock called the "Dimochline." 5 years.

— Tardy, father and son, merchants, Valencia, for a spinning machine, called the "filière unique." 5 years.

— Charles Benjamin Tienard and Adrien-Jean Baptiste Matthie, Paris, for a new invented patten or clog, with a slide. 5 years.

— Aloese Weinling, Gustave-Adolphe Marin, Jean Frédéric Schmidt and Ignace-Gall Fritsch, Paris, for certain improvements in terrestrial and celestial globes

— Pierre David, mecanician, Lyon, for an improved silk winder. 10 years.

— De Courtois-Duvallier, Paris, for a powder horn with a double charge, at different degrees. 15 years.

— Sebastien Erard, musical instrument maker, Paris, for a sounding board with valves, applicable to the organ, for increasing or diminishing the tone by the fingering only. 15 years.

— Edourd Hall, engineer, Paris, for a water mill applicable to waterfalls of different levels. 15 years.

— Jean Lambert Goulbièr, lamp manufacturer, Strasbourg, for a new lamp socket. 10 years.

— Michel Grand, mecanician, Marseilles, for a lever, which he has called the "balancoir moteur a la grand." 15 years.

— Guillaume Antoine Guérin, boot maker, Paris, for waterproof boots and shoes, called "antisoque." 5 years.

— Jean Thomas Hutter, master of the glass works at Rive de Gier, Lyons, for a mechanical revolving kiln for preparing window glass. 5 years.

— Claude Jaillet, junior, pattern drawer, Lyons, for a machine for making all kinds of figured stuffs. 15 years.

— Joseph Jaud, mecanician, Lyon, for a machine for winding silk, wool, cotton, &c. 5 years.

— Antoine Jourdan, Paris, for a perpetual kiln for preparing limestone, plaster, &c. &c. 10 years.

— Jean Baptiste Pirodon, wax and tallow chandler, Grenoble, for a method of making mould candles with two wicks.

— Louis Roth, Paris, for an apparatus for evaporating syrups, &c. without diminishing the quality. 15 years.

To Louis Charles Sterlin, ironmonger, Paris, for a new lock. 10 years.

— John Meadows White, London, for a combination of machinery or locomotive force, adapted to carriages and boats, &c. or which may be applied to engines of all descriptions. 15 years.

— Jean Joseph Nicolas, tanner, Paris, for a method of tanning rabbit skins. 10 years.

— Louis Benjamin Mazoyer Lagrange, merchant, Marseilles, for a process for clarifying liquids. 10 years.

— Denis Aguado Guitarist, Paris, for an apparatus for holding the guitar. 5 years.

— Constance Best, Paris, for a water mill or hydraulic machine. 15 years.

— Ives André Bingant, working jeweller, Paris, for a metal comb, in one piece. 5 years.

— Antoine Corrège, mecanician, for a kneading machine. 5 years.

— Jean Guillaume Duhamel, manufacturer, Darnetal, for an apparatus, combining economy of fuel adapted to various purposes.

— Pierre Erard, piano forte manufacturer, Paris, for sundry improvements. 10 years.

— Escarmella, chocolate maker, Paris, for a newly invented chocolate, called " Theobrama ou Mets des Dieux." 5 years.

— Pierre Ferraud, Paris, for a mechanical kneading machine. 5 years.

— Jacques Dominique Charles Gavard, Paris, for an apparatus for drawing, by a continual movement, without any knowledge of the art. 10 years.

— Pierre Noël Gérard au Mans, Sarthe, for improvements in tempering steel for making tools, &c. 5 years.

— Félix Haize, engineer, Paris, for a new kneading machine. 5 years.

— André Kæchlin and Co., manufacturers, Mulhausen, for a new invented loom, producing three movements. 10 years.

— Jean Auguste Philibert Alexandre Lacordaire, government engineer, Dijon, for a new system of rail roads. 10 years.

— Amand Mare, laceman, Paris, for a new child's pad, called " bourrelets hygiéniques." 5 years.

— Henri-Etienne Moiselet, mechanic, Lyons, for a machine for making hooks and eyes. 15 years.

— Castero, Paris, for a sub-marine apparatus for saving lives and property in cases of shipwreck, &c. 5 years.

To Salomon, musical professor, Paris, for an instrument for tuning, called the "accordeur." 5 years.

— Marie François Flechel and Jean Baptiste Joseph Deharbes, Paris, for a kiln for preparing turf. 5 years.

— Henri-Auguste Barbet, Brothers and Co., manufacturers, Rouen, for a winding machine, which stops of its own accord when a thread is broken. 10 years.

— Louis Cresson d'Orval, Paris, surgeon-midwife, for unirary probes and other improvements of caoutchouc. 5 years.

— Louis Nicolas de Bergue, mecanician, Paris, for an improved loom. 15 years.

— François Gueroult, Paris, for an improved process in making bricks, tiles, and architectural ornaments. 5 years.

— Jean-Julien Josselin, laceman, Paris, for certain improvements in ladies' stays. 5 years.

— Louis Florimond Miné, tinman, Paris, for improvements in the transport of night stools, &c. 5 years.

— René Monet, Paris, for an apparatus for making coke, and other improvements. 15 years.

— Charles Pocquel, Paris, for a new vapour bath, called "bains russes perfectionnés." 10 years.

— Hyppolite Royet and Co., ribbon manufacturers, Saint-Etienne, for the manufacture of ribbon of various colours. 5 years.

— Nicolas Wolf, Rottan, department des Vosges, for improvements in making charcoal. 5 years.

— Charles Ducret, junior, and Regnier, clock makers, Besançon, for a new invented timepiece. 5 years.

— Armand Nicolas Frèche, artist, Toulouse, for a mechanical flail. 15 years.

— Hérisson, M.D. and Garnier, watchmaker, Paris, for an instrument for telling the variation of the pulse, called the pulsometre. 10 years.

— Theodore Jones, London, for improvements in carriage wheels. 15 years.

— Lépine, Paris, for a portable apparatus for lighting apartments, manufactories, &c. by means of hydrogen gas and ordinary heat. 10 years

— Henry Cruger and Charles Fox Price, Bristol, for an apparatus for warming apartments, or an improved stove. 15 years.

— Mme. Rondet née Marie Louise Chéon, Paris, for an improved surgical instrument, called the pessaire. 5 years.

— Frdéric Soutzner, Paris, for a process for making the powder called "fleur de café." 5 years.

To Jean Stolle, colour and white lead manufacturer, Strasbourg, for machines, &c. for making nails, &c. 5 years.

— Henri Zilges, Paris, for a bridle for runaway horses, called bride d'airet. 10 years.

— Raffin and Vallon, cutlers, Paris, for a new invented grafting knife for general use. 5 years.

— Quartresols de Marolles, Versailles, for a mechanical flail. 5 years.

— Jean-Louis-Laurent Boudier, wheelwright, Passy, for a cart adapted to two or four wheels, by means of moveable axletrees, called the "chariot boudier." 5 years.

— Nicolas Sulot, music master, Dijon, for improvements in the science of music. 15 years.

— Auband Lamure Isère, for an economical oven for baking bread. 15 years.

— John Beare, London, for certain improvements in pumps. 10 years.

— Louis Jean Baptiste Bizet, tinman, Paris, for improvements in shower baths. 5 years.

— Isidore Delhomme and François Parabére, for a power machine. 15 years.

— Jean François Godin, manufacturer, Petit Bagneux, Seine, for a steel-yard for weighing carriages, called the "métrobare." 10 years.

— Thomas Oxnard, merchant, Marseilles, for improvements in refining sugar, 15 years.

— Antoine-Remi Polonceau, engineer, Paris, for a system of bridges.. 15 years.

— Pierre Louis Richou, Rouen, for improvements in carriages adapted for travelling. 10 years.

— James Viney, London, for improvements in the generating of steam, adapted to various purposes. 15 years.

— Louis Alexandre Buisson, glover, for improvements in skins intended for gloves, and for the invention of gloves called "gants denois and gants de Suisse." 10 years.

— Casalis and Cordier, mecanicians, St. Quentin, Aisne, for certain improvements in calendering cloth. 5 years.

— Jean Louis Fanon, packing case maker, for a peg for packing ladies' bonnets with safety, called the "champignon mécanique." 5 years.

— Jean Louis Pichonnier, cutler, Paris, additional patent for a new pen cutter. 5 years.

— Antoine Léandre Sardou, professor of geography, Paris, for a new system of maps used in teaching, and which he calls "mégalomappes." 5 years.

To Louis Serbat, chemist, Paris, for a process of decolorating sugar. 15 years.

— François Charles-Barthélemi de Souchon de Loubières, Paris, for a circular planisphere, applicable to clock-making and other purposes. 10 years.

— Hubert Chambry, hatmaker, Paris, for improvements in hatmaking. 10 years.

— Félix Cochaux, engineer, Liege, for a system of wheels adapted to steam carriages. 15 years.

— George Dauré, London, for improvements in distilling and extracting the gas, &c. from animal and other substances. 15 years.

— Etienne Jean Baptiste Gagneau, lamp manufacturer, Paris, for an improved lamp, called the "lampe aglatique." 10 years.

— Bonaventure Grillet and Antoine Blein, silk stuff manufacturers, Lyons, for a machine to prevent dyers from pilfering the silk entrusted to them. 5 years.

— Pauwels, Son, manufacturer, Paris, for improvements in steam navigation. 15 years.

— Antoine Dominique Sisco, locksmith, Paris, for an instrument for taking fire arms to pieces, and vice versa, called the "monte ressort boîte." 5 years.

— Nérée Tellier, goldsmith, for a new axletree, called "essieu telliér." 10 years

— Arlès and Delolme, merchants, Paris, for improvements in casting iron. 10 years.

— Jean Baptiste David, mechanic, Paris, for a mechanical kneading machine. 10 years.

— Charles Pierre Gourlier, architect, Paris, for a new mode of constructing tubes for chimneys, &c. 15 years.

— Joseph Eloi Xavier Jullien, printer, Montpellier, for a pedal movement. 10 years.

— Pelletan, Dr., physician to the king, for improvements in steam navigation, the machinery being made to act below the level of the water only. 15 years.

— Thomas Revillan, clockmaker, Mâcon, for a machine for receiving the pressure of fluids, &c. and converting it into a moving force. 15 years.

— Calas and Butler, Paris, for improvements in making stuffs by means of an instrument called "temple or tempia." 5 years.

— Nicolas Houzeau Muiron, manufacturer, Rheims, for an economical method of making and printing waterproof stuffs. 5 years.

To Alexandre and Zacharie, feather makers, for a stuff made of feathers. 6 years.

— Pierre Clament Zuntz, Paris, for a method of making verdigrise. 5 years.

— Louis Brunier, architect, Paris, for an hydraulic machine, called the "hydromoteur-conterm." 15 years.

New Patents Sealed,

To William Mason, of Margaret Street, Cavendish Square, in the county of Middlesex, axle tree maker, for his having found out and invented certain improvements on axle trees, and also the boxes applicable thereto. —Sealed 24th Aug. 6 months.

To Thomas Barratt, of Saint Mary Cray, in the county of Kent, paper maker, for his having invented certain improvements on machinery for making paper.—31st Aug. 6 months.

To Augustus Applegarth, of Crayford, in the county of Kent, printer, for his having invented certain improvements in printing machines.—31st Aug. 6 months.

To William Losh, of Benton House, in the county of Northumberland, Esq. for his having invented certain improvements in the construction of wheels for carriages to be used on railways.—31st Aug. 6 months.

To Edwin Budding, of the Thrupp, in the parish of Stroud, in the county of Gloucester, machinist, for his having invented a new combination and application of machinery for the purpose of cropping or shearing the vegetable surface of lawns, grass plats of pleasure grounds, constituting a machine which may be used with

advantage, instead of a scythe for that purpose.—31st August. 2 months.

To John Hanson, of Huddersfield, in the county of York, plumber and brazier, for his having invented certain improvements on locomotive carriages.—31st August. 6 months.

To Edwin Clayton, of Briddlesmitle Gate, in the town and county of the town of Notingham, baker, for his having invented an improved mode of manufacturing dough or paste, for the purpose of baking into bread. 31st Aug. 6 months.

To Thomas Thacher, of the parish of Birmingham, in the county of Warwick, saddler, for his having invented or found out an elastic self-adapting saddle.—7th Sept. 6 months.

To Peter Williams, of Holywell, in the county of Flint, surgeon, for his having invented an apparatus or contrivance for preventing accidents in carriages, gigs, and other vehicles, by instantly and effectually liberating horses or other animals from the same, when in danger or otherwise, and for locking and securing the wheels thereof, in cases of danger, emergency, or otherwise.—7th Sept. 6 months.

To Charles Blacker Vignoles, of Furnival's Inn, London, and John Ericsson, of Brook-street, Fitzroy-square, in the county of Middlesex, civil engineer, for their having invented certain additions to the engines commonly called locomotive engines.—7th Sept. 6 months.

To William Cook, of Redcross-square, Cripplegate, in the city of London, fine-worker, for his having invented certain improvements on cocks for supplying kitchen ranges or cooking apparatus with water, and for other purposes, to be called fountain cocks.—7th Sept. 6 months.

To Henry George Pearce, of Liverpool, in the county of Lancaster, master mariner,—Richard Gardner and Joseph Gardner, of the same place, merchants, for their having invented an improved fid.—7th Sept. 6 months.

To James Chadley, of Gloucester-street, Queen-square, surveyor, for his having invented certain improvements in making or forming bricks, tiles and chimney bars, applicable to building or erecting the flues of chimnies.—13th Sept. 6 months.

To Seth Smith, of Wilton Crescent, in the parish of St. George Hanover-square, in the county of Middlesex, builder, for his having found out and invented certain improvements in chimnies for dwelling and other houses and buildings.—14th Sept. 2 months.

To Francis Molyneux, of Hampstead, in the county of Middlesex, gentleman, and William Bundy, of Kentish Town, in the same county, mechanist, for their invention of certain improvements in machinery for spinning and twisting silk and wool, and for roving, spinning, and twisting cotton, flax, hemp and other fibrous substances.—21st Sept. 6 months.

To William Church, of Heywood House, Bordsley Green, in the county of Warwick, gentleman, for his invention of certain improvements in the construction of boats and other vessels, a part of which improvements are applicable to the construction of carriages.—21st Sept. 6 months.

CELESTIAL PHENOMENA, FOR OCTOBER, 1830.

D.	H.	M.	S.	
1	19	57	0	Ecliptic opposition or ○ full moon.
2	20		0	☾ in conj. with ν in Pisces
3	22		0	☾ in conj. with μ in Ceti
4	16		0	☾ in conj. with f in Taurus
5	0		0	☉ before the Clock 11 *m*. 28 Sec.
5	12		0	☾ in conj. with γ in Taurus
5	13		0	☾ in conj. with 1 δ in Taurus
5	13		0	☾ in conj. with 2 δ in Taurus
5	18		0	☾ in conj. with α in Taurus
6	0		0	☾ and Aldebaran an occultation
6	8	0	0	♀ in conj. with β in Virgo
8	10	32	0	☾ in ▭ last quarter
10	0	0	0	☉ before the Clock 12 *m*. 52 Sec.
10	1	0	0	☿ in conj. with ι in Virgo
10	10	0	0	☿ in conj. with α in Virgo
10	21	0	0	♃ in conj. with 1 ν in Satt.
12	7	0	0	☾ in conj. with ρ in Leo
12	20	0	0	♀ in conj. with υ in Virgo
13	7	0	0	☾ in conj. with σ in Leo
13	22	0	0	☾ in conj. with β in Virgo
14	14	0	0	☾ in conj. with η in Virgo
15	0	0	0	☉ before the Clock 14 *m*. 4 Sec.
15	1	0	0	☾ in conj. with 1 γ in Virgo
15	0	0	0	☾ and ♀ an occultation Immersion 3 h. 0 *m*. 15 s. Emersion 5 h. 43 *m*. 18 s.
16	0	0	0	♅ Stationary
16	7	31	0	Eclip. conj. or ● new moon
17	12	0	0	♀ in conj. with 1 ν in Virgo
18	20	0	0	☽ in conj. with υ in Libra
19	0	0	0	♂ Stationary
19	7	0	0	☽ in conj. with ψ in Libra
19	23	0	0	☽ in conj. with φ in Oph
20	0	0	0	☉ before the Clock 15 *m*. 3 Sec.
20	21	0	0	☿ in conj. with ♀ Long. 11° in Virgo ☿ lat. 47' N. ♀ lat. 1° 29' N. diff. of lat. 42'.
21	0	0	0	♀ Stationary
23	6	0	0	☽ in conj. with *d* in Sagitt
23	10	7	0	☉ enters Scorpio
23	17	0	0	♀ in conj. with ϑ in Virgo
24	10	20	0	☽ in □ first quarter
25	0	0	0	☉ before the Clock 15 *m*. 45 Sec.
27	7	0	0	☽ in conj. with λ in Aquarius
27	16	0	0	☽ in conj. with φ in Aquarius
27	18	0	0	♀ in conj. with ϑ in Virgo
28	4	0	0	☽ in conj. with ♂ long. 21° in Aquarius ☽ lat. 1° 9' S. ♂ lat. 2° 21' S. diff. of lat. 1° 12'
29	10	0	0	♃ in conj. with ο in Sagitt
30	0	0	0	☉ before the Clock 16 *m*. 10 Sec.
30	7	0	0	☽ in conj. with ν in Pisces.
31	5	18	0	Ecliptic oppo. or ○ full moon
31	9	0	0	☾ in conj. with μ in Ceti

The waxing moon ☽.—the waning moon ☾

METEOROLOGICAL JOURNAL, FOR AUGUST AND SEPT. 1830.

1830.	Them.		Barometer.		Rain in inches·	1830.	Thermo.		Barometer.		Rain in inches.
	Hig.	Low	High.	Low.			Hig.	Low	Hig.	Low.	
Aug. 26	66	49	29,76	stat.	0,75	11	61	39	29,66	stat.	,05
27	65	51	29,76	29,50		12	58	45	29,36	29,31	,15
28	61	50	29,51	29,36	,4	13	62	30	29,50	29,40	,1
29	64	46	29,99	29,83	,125	14	64	41	29,45	29,36	,025
30	65	38	30,11	stat.	,05	15	64	41	29,66	29,55	
31	67	36	30,16	stat.		16	63	52	29,70	29,50	,15
Sept. 1	69	46	30,23	stat.		17	58	41	29,66	29,57	,273
●	69	41	30,14	29,94		18	63	43	29,80	29,53	,05
3	65	50	29,79	29,76	,025	19	62	38	29,86	29,69	
4	68	51	29,85	stat.		20	59	46	29,55	29,32	,1
5	64	48	29,66	29,65	,125	21	54	47	29,29	29,22	,4
6	59	50	29,58	29,46		22	59	34	29,66	29,40	,1
7	62	50	29,74	29,64	,375	23	62	44	29,56	29,31	,325
8	62	50	29,95	29,86	,075	24	61	43	29,64	29,53	,025
9	58	39	29,83	29,63		25	57	43	29,84	29,61	,1
10	62	49	29,65	29,59	,275						

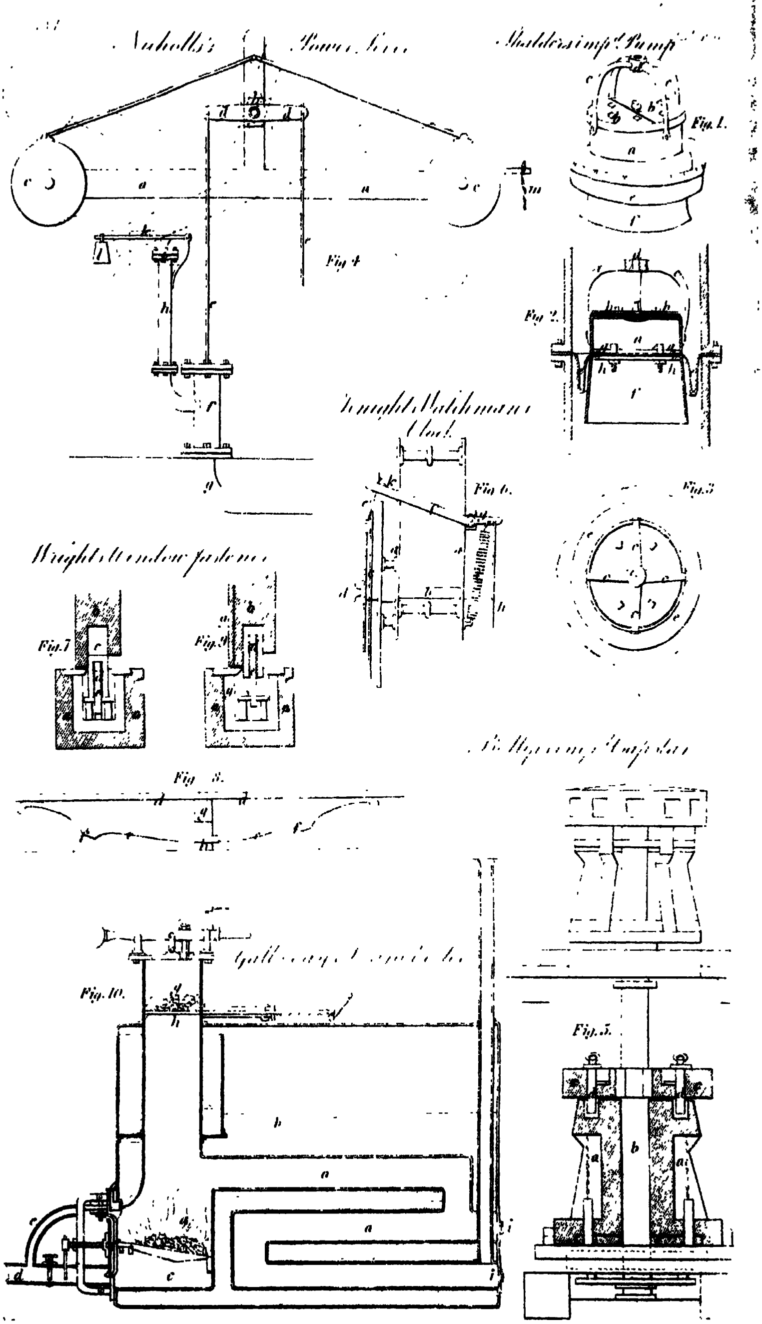
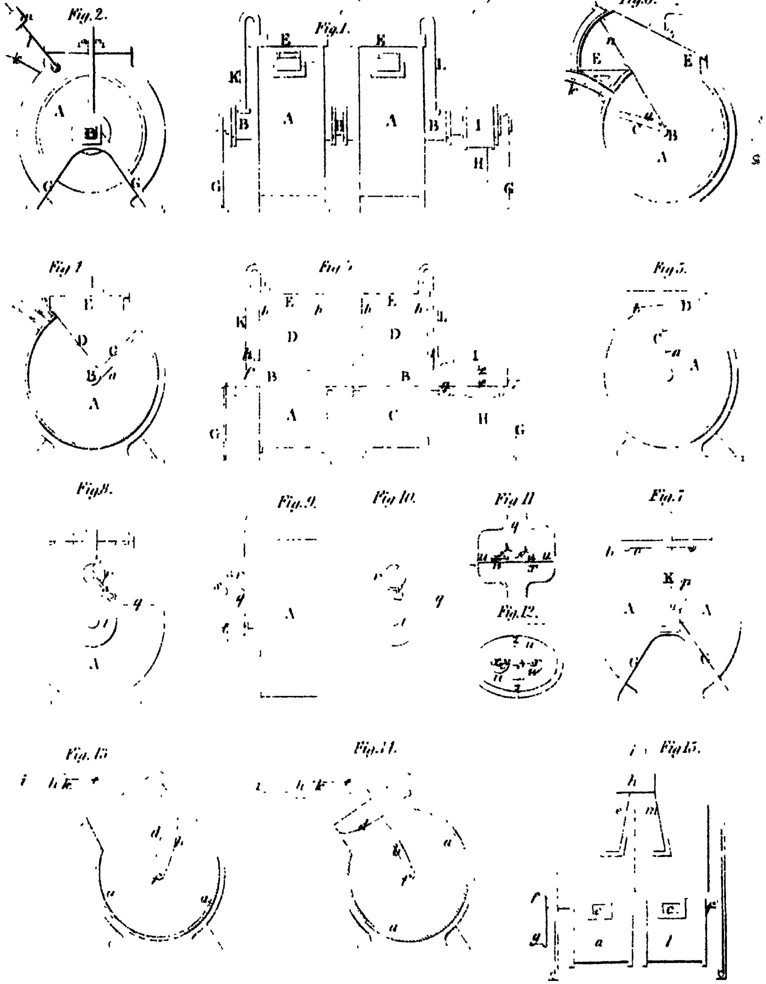
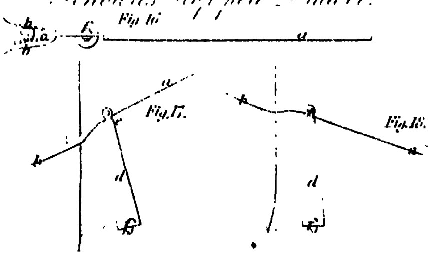


Fig. 1.
Fig. 2.
Fig. 3
Fig. 4
Fig. 5.
Fig. 6.
Fig. 7
Fig. 8.
Fig. 9
Fig. 10.

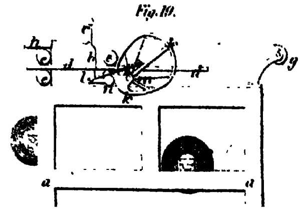
[illegible] Rotatory Steam Engine



[illegible]



[illegible] Power Loom.



THE

London

JOURNAL OF ARTS AND SCIENCES.

No. XXXII.

[SECOND SERIES.]

Original Communications.

ART I.—ON SHALDER'S PATENT FOUNTAIN PUMP.*

To the Editors of the London Journal of Arts, &c.

GENTLEMEN,—Of all machinery adapted to the general uses of life, none is so universal, and none more important than that which is constructed for the purpose of raising water from one situation to another. It therefore follows that any improvement by which this object may be effected with greater facility, convenience and dispatch,

* *Note.*—In Vol. XII. of our First Series, page 9 and Plate I, a description of Mr. Shalder's invention is given, which he there denominates a gravitating and expressing fountain. The essential part of the invention has now assumed a somewhat different appearance, and being practically applied with considerable advantage to pumps, we are persuaded that the following communication will be acceptable to our readers.—EDITOR

becomes of the highest value to the world, and as far as regards mechanical invention, is of greater consequence in this than in any other species of machinery.

To prove this assertion, it would only be necessary to point out the numerous attempts which have been made to accomplish this desirable end. It has been the research of learned and scientific men; but many centuries have elapsed, and we have still found the same mode handed down to us, with all its acknowledged imperfections. In the invention which I am about to introduce to the reader's notice, every former deficiency is remedied, and the object required is produced by the most direct and satisfactory means, leaving no desideratum; and there is no doubt, from the strong testimonials of its efficacy, that in the course of a short time this invention will wholly supersede every other method at present in use.

When the principle of this fountain pump is thoroughly understood, its advantages are sufficiently obvious, and to those who do not comprehend its construction, or are at a loss to perceive its peculiar mode of action, I need only refer to the numerous demonstrations of its superiority. These facts decide at once in its favour.

I am now only speaking of its comparative working properties, and increased power in raising water: but when to these it is added that the fountain pump is more durable, more economical, and more simple in its construction, there can be no hesitation in yielding to it the most decided preference, whether applied to the arts, navigation, or domestic purposes.

In the common pump, when properly made, the piston should fit the inside of the working barrel so closely as to form a perfect vacuum, that the leather or packing may press hard against the sides of the cylinder; this consequently produces, when the pump is in action, an

irregular, unsteady resistance, while independently of the unnecessary waste of power to counteract friction, produces an uneasy stiffness in motion, which soon wearies the performer. By the advantages possessed in the invention under consideration, no friction occurs, and these defects are wholly obviated.

With the common pump, solid substances as hard pieces of wood, particles of sand, &c. &c. are very apt to insinuate themselves between the bucket and the barrel; these may either unpack the piston, or by grinding and tearing the leather, or forming grooves in the barrel, render it totally unserviceable, until it again passes through the hands of the maker. In this improvement the connecter is so constructed as to cast up and deliver solid substances with as great facility as it does the fluid, and without the possibility of injury or derangement to the workmanship.

In the pump constructed upon the new principle, the bucket is surrounded by a strong pliable leather tube, which I call the connecter, of a conical figure, or the diameter of one end is rather less than that of the other; this is supported by the expresser or bucket when in movement, and easily admits of being inverted and retroverted. Its lesser circumference is closely secured to the upper and outer extremity of the expresser; and the larger circumference is fastened to the inner part of the cylinder between two flanges. This effectually precludes the possibility of leakage, as the connection is completely cut off between the upper and lower portion of the barrel, except through the valve of the bucket. Thus we have the three grand defects of the common pump, from friction, choking and leakage entirely remedied besides, as before stated, less original expense, less wear and tear, and greater simplicity.

The operation of the pump on the improved plan may be compared to the action of lifting through the air a bucket of water, suspended to the counter end of a lever or pump handle. Supposing the bucket at each depression of the handle to empty itself, and to refil at each elevation, we have a representation of its mode of action, there being neither more or less friction in resistance in the one instance than the other. There is only the weight of the water to contend with, and so ample is the power gained by the adaptation of the new principle, that double the work may be accomplished in a given time, in other words, that one man may perform the work of two, or what would occupy a man two days to complete, may be finished in one day.

The following is a description of this invention given by a scientific gentleman of acknowledged talent:—" This improvement is designed to avoid the friction of an ordinary pump, by substituting in place of the usual air and water tight packing of the piston or bucket, a flexible tube or diaphragm surrounding the bucket, which rises and falls with it. Plate III, fig. 1, represents the bucket with its diaphragm and other appendages detached from the pump and shewn in perspective. Fig. 2, is a geometrical section of the same taken through the middle perpendicularly; and fig. 3, is a plan or horizontal view of the same, as it would appear when seen from above. In all which figures similar letters refer to corresponding parts; *a, a,* is the bucket or piston of the pump, having two valves *b, b,* opening upwards as usual; *c, c,* are bent arms, for the purpose of attaching the bucket to the pump rod at *d,* by which the bucket is to be raised and lowered in the pump barrel, by means of the pump handle, or by any other common contrivance.

" The diaphragm *e, e,* is a tube of leather or other suitable

flexible material, which is air and water tight. It is made from a disc of leather, rather larger in diameter than the interior of the pump barrel, in the centre of which a circular hole is to be cut, rather smaller than the interior of the bucket, which gives it the form of a broad ring; this ring of leather is then soaked and pressed upon a block until it is brought into the form of a frustrum of a cone, very much resembling in shape a round hat, with the centre of the crown removed: the frustrum having a narrow rim at bottom on the outside, and a similar rim at top on the inside, which two rims are for the purpose of attaching the diaphragm to the pump barrel, and to the bucket.

"To the lower part of the bucket a cylindrical or bell-formed tube *f*, is attached, for the purpose of preventing the diaphragm from collapsing under the bucket when the pump is in action. At the lower part of the bucket there is an internal flange *g*, *g*, and a corresponding flange, *h*, *h*, at the upper part of the bell-formed tube, which two flanges take hold and confine the inner rim of the diaphragm, and are held together by screws, bolts, and nuts, as seen in fig. 2. The outer rim of the diaphragm is in a similar way held securely between flanges in the pump barrel, and by these means the upper and lower parts of the pump barrel are separated, and an air and water tight partition formed, without packing the bucket as in ordinary pumps.

"It will now be seen that on the ascent or descent of the bucket, the diaphragm being flexible, will readily rise and fall, leaving the water way clear and effecting all the purposes of a tight bucket or piston, without producing any of the friction which results from the employment of a bucket fitted closely to the barrel, as in pumps of the usual construction."

Experiments have been frequently made with this improved pump, by introducing sand, fragments of wood, gravel, apples, &c. &c. yet any substance capable of passing the valves has been ejected along with the water, without the least impediment or detriment. There is likewise a large body of evidence from practical manufacturers, who have made use of the fountain pump for different purposes, for various periods, from one to four years; these distinctly assert its manifest superiority, and amply confirm the character just given of it.

The patent pump is confidently recommended to engineers, as being the most efficient machine to remove or supply large bodies of water. By the aid of the steam engine its operations would be prodigious, while the saving of fuel and attendance would reduce the expenses by one half. To water companies it will shortly become an essential auxiliary, and it will be the duty of those who have the public trust reposed in them to employ it. The same observations will apply to mining operations, either to those conducted by public associations, or by private individuals; with them it is indispensible, as it is the only machine not liable to embarassment by the presence of sand, gravel, &c. &c. It is well known that many mines, after much delay and expense, have been abandoned from this very cause.

To road surveyors its utility is conspicuously pointed out; in watering the roads, dispatch is requisite, as the watering ought to be finished in the early part of the day; double the number of carts may be engaged at once, and the whole be completed in one quarter the time, and at half the expense.

To breweries it will become a necessary appendage, as it may be easily removed from one place to another; the work will be concluded in one half the time, or boys

may be substituted for men, which in the course of a year, will produce a material saving. The same remarks are applicable to tanneries, to pump the water and ouze; in distilleries, the wash and spirit; and in dye houses, the dye, &c.; for these purposes the pumps may be constructed of wood, &c. at a very trifling prime cost. For brickmakers, excavators, &c. it is the only pump suitable to their purposes.

The utility of the pump is so general, that it may be said that no establishment of any description is complete unless so provided; in the house, in the garden, in the stable yard, pumps on this improved principle are most particularly adapted, as children or females can work them with the greatest ease, and when out of order, though seldom, they may be repaired without the aid and expense of a plumber.

For the purposes of agriculture in dry seasons, they may be employed on an extensive scale to irrigate the land, as the labour of supplying water is so materially diminished; and when used for the purpose of drainage, large tracts of land may be brought into cultivation.

In nursery grounds and large gardens, where diffusion of water is so essential, they will become a valuable acquisition.

In our West India posessions, and other colonies, where large supplies of water are required for cattle, and numerous other services, the fountain pump will become a necessary apparatus; those they have in use at the present time are, generally speaking, extremely defective; this circumstance arises from the common pump being so soon out of order, from its defect in principle, and from being little understood, except by workmen, who most usually reside at a distance.

Proprietors of estates are therefore particularly en-

joined to direct their attention to this object, as they can always have the independent means of possessing a superior and more powerful machine, easily repaired, and attended with infinitely less expense. Those who desire to have the ordinary friction pump process replaced by one on the new plan, have no necessity to alter the former arrangement of pipes, machinery, &c.; it would only be requisite to supply a new cylinder and expresser. The principle of the improvement can also be applied to the forcing pump, where it still preserves its extraordinary advantages. For fire-engines, deep wells, and to supply elevated situations, it is admirably calculated. In short, to those who are zealous in real improvement, or have economy in view, the fountain pump is earnestly recommended as a machine whereby much time and outlay will be ultimately saved: in every instance where a pump is required, it is infinitely superior, and in some instances it will not admit of substitution.

I am, Gentlemen, yours, &c.

Commercial Road.

JOHN ELLIOTT,
Civil Engineer.

ART. II.—ON NICHOLLS' POWER LEVER.

THE following paper referring to Nicholls' Patent for improvements in the application of the lever (or rather pendulum) to generate power, is forwarded to us by a correspondent. We have no doubt but that the inventor is labouring under an error, but we do not feel justified in suppressing facts which appear to be sanctioned and supported by respectable authority. The Specification of this invention will be found in Vol. IV. of our present Series, page 35 and Plate III.

To the Editors of the London Journal of Arts, &c.

GENTLEMEN,—Herewith you will receive a statement of a series of trials made with a view to determine the power of "*Nicholls' Improved Lever.*" If you should consider this detail of particulars sufficiently interesting, you will perhaps find room for their insertion in your ensuing Journal. The ingenious inventor will be obliged by the opinions of your intelligent correspondents on the merits of his invention.

Plate III, fig. 4, is a rude sketch of the apparatus now stationed at the Regent's Canal Basin, near Battle Bridge, St. Pancras, and which is open to the inspection of scientific gentlemen who may wish to investigate the principle of the invention.

A straight beam of wood, *a, a, a,* having a piece fixed to it, in the centre at right angles, is made to vibrate on an axle or pivots at *b*, supported by framings not shown. The extremities of the beams are weighted by cast iron discs or plates, attached to it, and the whole is strengthened by rods which tie the ends of the beams to the central piece; *d, d,* are two arms extending from the central piece, and vibrating with the beam, to which pump rods *e, e,* are connected by joints; *f*, represents one of the pumps fixed to the floor below, to which *g*, is its suction pipe, and *h*, the pipe for the ascending column. The top of the pipe *h*, is closed by a valve *i*, which valve is loaded with a weighted lever *k*, the weight *l*, being adjustable upon the lever, in order to give any required pressure, and thereby ascertain the power exerted by the pump. The actuating power being applied at the end of the lever by an arm and rope *m*, or otherwise, the beam is made to vibrate, and the water lifted by the force of the pump, on being discharged through the valve at top, flows into a wooden shute, represented by dots, and from thence is emptied by a pipe into a tub below, or flows away.

REPORT

Of a series of experiments made with a view to determine the power of the "Improved Lever."

The lever was of the principle described in the Specification and drawings, but applied to pump water only, constructed of deal timber, and weighted by plates of cast iron attached to each end. In dimensions the lever was eleven feet from the fulcrum or axis on which it moved to the centre of the weighted discs or plates, and the line of the centre of the weighted plates three feet below the axis of motion, the weighted plates being braced to the top of the centre part two feet four inches above the axis of motion, as in the figure.

The working barrel of the pump attached to one of the double arms by a connecting rod, was nine inches diameter, and admitted of a twenty-inch stroke. The suction and upright pipe five inches diameter. The height from the water to the working barrel two feet. The barrel two feet, and the upright pipe nine feet, making together thirteen feet from the surface of the water to the point of delivery.

Two men working the lever by a jerk or pull, made eleven strokes, of eighteen inches each in one minute, raising four gallons at each stroke. A valve tightly fitted to the top of the upright pipe, was weighted by a graduated lever, and with 200 pounds pressing on the valve, two men were able to make twelve strokes, of sixteen inches each, in one minute.

The facts here stated are not perhaps of so decided a character as might have been wished, yet enough has been done to shew that the vibration of suspended weights may probably be applied with advantageous effect, under given circumstances, but how far they originate a power that can be generally applied as a first mover, experience alone will determine.

The men employed in the four first experiments were a

millwright, a moderate sized man about eleven stone, and a youth of sixteen, about nine stone. The other experiments were made by a labourer, of short stature and ordinary muscular formation, about ten stone and a half, and the same youth as in the former experiments. See the detail of experiments in the following Table:—

Tabular Results of Experiments, &c.

Date of Experiments on the Power Lever	Length of the stroke in inches.	Number of strokes per minute.	Weight of water raised in lbs. in 1 minute.	Weight put on the valve.	Total weight moved at 13 feet high.	Effect in feet equal to the Alt. of a [illegible]-in. coln.	Quantity of water rais'd in gallons.	Men employed to work the lever
1830:								
July 26th - -	18	11	455	000	455	13	45	2*
Ditto - -	16	12	432	224	656	36	43	2
—— 29th - -	14½	11	364	224	588	36	36	2
Ditto - -	14	13	392	000	392	13	39	1†
August 2d - -	12	12	310	168	478	29	31	2‡
Ditto - -	9	12	248	224	472	36	24.8	2‡
Ditto - -	8½	12	233	280	515	42	23.5	2‡
Ditto - -	7½	12	207	392	599	56	20.7	2‡
Ditto - -	8½	13	221	336	577	49	22.	2‡
Ditto - -	6½	12	179	448	627	62	18.	2
Ditto - -	6½	11	164	560	720	75	16.4	2
August 3d - -	7½	11	187	448	635	62	18.7	2
Ditto - -	6¾	11½	166	560	726	75	16.6	2
Ditto - -	4½	12	136	840	976	108	13.6	2

* In this experiment the lever was worked but with little exertion.

† The water collected in this experiment was thirty-six gallons, besides the waste.

‡ In these experiments the working was performed by an ordinary labourer, and a youth, without much difficulty.

In the latter trials the suspended weights were increased from 8½ cwt. to 13½ cwt. at each end of the lever; the effect appeared to be a somewhat shorter stroke, the lever moving through less space, and requiring additional steady force to effect a regular pumping motion; the lever however appeared to increase in its power by additional weight.

In these calculations the weight on the valve of the pump of the unbalanced column of water is uniformly taken at eighty-five pounds. The weight of water at each inch of lifting is taken at two 3-10 pounds, and the power of a man, six cubic feet of water raised ten feet high per minute.

Comparing the water collected and measured with calculation, it appeared that the latter exceeds the former by about one-thirteenth part, and this difference appeared to be uniform in several trials.

To establish the fact of a man raising a given quantity of water per minute, a handle or lever ten feet long was attached to the same pump, under very favourable circumstances for working, and by great exertion a man raised six cubic feet, thirteen feet high, per minute by calculation; this however, was a labour he could not continue for more than a few minutes; he appeared to very much prefer working by the jerk or pull, as applied to Mr. Nicholls' machine. The valve was then weighted with 224 pounds, and the same two men were unable to pump at all with effect by the handle or lever, the force required being beyond their strength. This trial may be compared with Nos. 2, 3, and 6, in the table, made with the lever. At thirteen feet high the common pump exceeded the machine in effect, but under heavy pressures the machine appeared to greatly exceed the force of man, applied by ordinary means.

Some variety appears in the results which cannot.

perhaps, be satisfactorily explained. The friction in the machine might be variable, or the physical exertions of the men working the machinery, may have been greater at one time than another. I am inclined to refer a good deal to the latter cause—want of experience, however, may account for some part of the irregularity; an exact alternate operation as to time is required, for if the lever has not its regular sway, or is checked by an untimely application of force, the effect of the suspended weights is counteracted, and the force of the man exerted on the machine, without a correspondent effect.

The experiments made Aug. 2d and 3d, were made with a bar of iron attached to one end of the lever seven or eight feet in length, but this addition of leverage did not appear to add much to its power, or to materially decrease the speed of the vibrating weights. At the end of the extended bar, a man can only exert his force through a short space, and that the effect of a dead weight is superior to a jerk or pull, was in one case proved by a man walking on the top of the beam.

Those conversant with these subjects will at once perceive the difference between the balanced lever and the arrangement suggested by Mr. Nicholls. The balanced lever being uniformly in a state of equilibrium, but Mr. Nicholls' lever is only in equilibrium in one particular position, and that equilibrium being disturbed by a convenient force, the question to be resolved in this case is—*Do the suspended weights, in their efforts or disposition to regain an equilibrious state, exert a force that can be applied to useful purposes?*

It is due to Mr. Nicholls' invention to observe, that whatever power may be derived from the *libration* of *suspended weights*, only a portion of that power can have been employed in the experiments to which these observations apply, for the pump used in these trials

was only attached to a single arm on one side the axis; but had the pump been constructed double, so as to admit of a connection at each side the axis of motion, the quantity of water raised must have been greatly increased, as will appear obvious, from a consideration of the drawing.

The approximation of the improved lever to the principle of the pendulum is sufficiently obvious, and the number of vibrations in a given time are of course limited by the general principle; experience, however, must determine the amount of weight that may be advantageously suspended, as well as the distance of the centre of oscillation from the (axis of motion or) centre of suspension.

I am, Gentlemen,

Yours, &c.

King Square, Oct. 1830. J. RAYNER.

Recent Patents.

To JOHN STREET, *of Clifton, in the county of Gloucester, Esq. for his invention of a new mode of obtaining a rotatory motion by water, steam, gas, or other vapour, being applicable also to the giving blast to furnaces, forges and other purposes, where a constant blast is required.*—[Sealed 5th August, 1830.]

SPECIFICATION.

"MY new mode of obtaining a rotatory motion by water, steam, or gas, or other vapour, and which is applicable also to giving blasts to furnaces, forges, and other purposes, where a continued blast is required, consists in the employment of a novel construction of rotary engine, the particular features of which are set out in the accompanying drawing, see Plate IV.

Fig. 1, represents the external appearance of the engine complete, as seen in front; fig. 2, the same seen endways; A, A, are two distinct cylindrical vessels fixed to a basement; through the centres of which cylinders, the hollow axle B, B, B, passes. Within each of the vessels A, A, there is a rotary piston and lever valve, which will be described hereafter; fig. 3, is a longitudinal section of the machine, taken through the middle in the direction of fig. 1, and fig. 4, is a transverse section of one of the chambers with its piston C, and valve or steam slips D; fig. 5, is another section taken in the same direction, supposed to represent the other vessel.

The cylindrical vessels A, I propose in preference, to be made of cast iron, as most eligible, but other materials will answer the purpose. The interiors of the cylinders must be rendered perfectly true, and their sides flat, in order that the edges of the pistons may fit closely and steam tight, as they go round; the axle B, B, is hollow throughout, but closed at its ends, and is turned perfectly true and cylindrical on its outer surface; the pistons C, C, stand radially from the axle to which they are affixed, in diametrically opposite directions in the two cylinders, as shewn by dots in figs. 4 and 5. I propose to make them of sheet iron, cut to a rectangular figure, corresponding to the form of the interior of the cylindrical vessels.

On the front or advancing side of each piston I attach a curved bar *a*, for the purpose of giving stability to the plate, and is intended to act as a wiper in raising the valve or steam stop. A portion of the upper part of each cylinder is removed to the extent of about sixty degrees of its circumference, and a rectangular box E, E, formed over it, which, with the cylinder, constitutes the close vessel that the piston moves in.

The lever valve or steam stop D, is a rectangular plate of iron, or other suitable material, mounted on pivots *b, b*. The lower edge of the valve bears upon the periphery of the cylindrical axle, and in that situation acts as a steam stop or partition dividing the vessel. The valve is packed on its edges and back to prevent the passage of steam.

"Having described the construction of the cylindrical vessels A, with its piston C, and valve or steam stop D, it is only necessary to say, that both the cylindrical vessels, with their pistons C, and valve D, are precisely alike, and that there being one common axle passing through both, with the pistons placed in opposite directions, the operations of the pistons are reciprocal. The outer extremities of the hollow axles, which are closed, have gudgeons on the ends, which will be seen in figs. 1, 2, and 3, and are supported on standards G, G, with plummer boxes for them to turn in. A steam pipe H, leading from a boiler, situate at any convenient distance, conducts steam of any desirable pressure into the steam box, I, which embraces the hollow axle, and is properly packed, to prevent the loss of steam. From this box I, the steam passes into the hollow axle B, through apertures *e, e*, fig. 3, and having filled the hollow axle, the steam proceeds through the other apertures *f*, and *g*, up the pipes K, and L, into the cylinder. The induction apertures *f*, and *g*, for delivering the steam from the hollow axle, are to be on opposite sides of the axle, so that when the steam is passing up the pipe K, into one of the cylinders, it is shut off from the pipe L, and the other cylinder, and vice versa. The apertures for admitting the steam into the pipes K, and L, are made at *h, i*, in the upper parts of the outer flanges of the cylinder, as will be seen in the longitudinal section, fig. 3; they may be of any convenient width, but are to extend round only

about seven sixteenths of the circumference; and the corresponding aperture *f*, and *g*, in the axle, is to be about six sixteenths of the circumference. The apertures through the axles at *f*, and flange at *h*, towards the left end of the machine, as seen in fig. 3, being now supposed to be open, the steam will pass up the pipe K, into the box E, and thence into the left hand cylinders, the transverse section of which, with the position of the piston and valve as now situated, is shewn by fig. 4. The steam thus blowing into the cylinder, meets a firm resistance against the inclined valve or steam stop D, but pressing also against the back of the piston C, forces the piston round in its circular course within the cylinder, and gives to the axle a rotatory motion, which may be applied as a first mover to the driving of other machinery. By the time that the piston C, in fig. 4, has arrived at the situation shewn by dots, the piston in the other cylinder has been brought into a similar situation to that in fig. 4, ready to receive the force of the steam, and in passing round this circuit, the wiper *a*, at the back of the piston C, has raised the lever valve D, for the purpose of enabling the piston to pass, as shown in fig. 5. By the time that the piston has arrived at the situation shown by dots in fig. 4, or further in advance, above forty-five degrees, the induction aperture has become closed, and the piston is carried forward by the action of the steam upon the piston in the other cylinder, until it has arrived at K, which is the eduction or exit aperture through which the expended steam is allowed to escape.

"The steam being admitted through the induction aperture, at the reverse end of the axle, passes into the other cylindrical chamber, and forces the piston round, raising the steam stop or valve in the way already described; by which successive admissions of steam, the

pistons with the axle are made to perform a continuous rotatory motion.

In the foregoing I have described the lever valve, or steam stop, to fall by its gravity upon the axle of the piston, which in some cases may be found objectionable, I therefore shall describe my method of counter balancing the steam stop, so that its fall may be regulated. The ends of the pivots or axle on which the steam stop turns, are made to project through the side of the box E, of the cylindrical chamber; and on the end of one of the pivots a lever *l*, (see fig. 2), is affixed, with a counter balance weight *m*, attached to its end. This weight may be adjusted by sliding it up or down the lever, so as to wholly or partly balance the steam stop as may be required; the parts round the pivots being packed steam tight.

Another mode of balancing the steam stop is shewn in fig. 6; where it will be seen that the rectangular box or chamber E, E, is enlarged, for the purpose of enclosing the counter balance weight *n*, which does not require the pivots or axle of the steam stop to project through the side of the cylinder, but the upper end and the edges of the counter balance *n*, must be steam tight in this situation. I do not, however, intend to confine myself to these particular modes, as there are other methods of balancing the valve than those I have described, nor do I intend to confine myself to the mode described of lifting the lever valve or steam stop, by means of the wiper on the rotatory piston within, as I propose under some circumstances, to raise these steam stops by means of wipers on the outside of the cylindrical chambers, as shewn in the end view, fig. 7, where *o*, is an arm or lever affixed on the end of the axle of the steam stop or valve, and *p*, a wiper fixed on the rotatory axle of the piston, which as it revolves, coming in contact with the

arm or lever, raises it, and consequently the valve also, which will enable the piston to pass as already described.

I sometimes construct my rotatory engines with a solid axle, and in that case pass the steam direct to the cylinders through the steam pipe from the boiler, and regulate the supply and admission of the steam by peculiarly formed valves contained within the steam pipe, by which I dispense with the hollow axle and the steam box before described.

" Fig. 8, is an end view, and fig. 9, a front view of one of the cylinders of an engine upon this construction; *q*, is the steam pipe leading from the boiler, having the enlarged part at *r*, formed into a box, to allow the regulating valve to work in; this valve is like the ordinary throttle valve of a steam engine, and is opened and shut by a lever *s*, on the end of its axle; which lever is acted upon by a rotatory cam *t*, fixed on the main axle of the engine. This cam has a part of its periphery removed, for the purpose of allowing the end of the lever to fall upon its smaller diameter, and close the valve (as shown in the section, fig. 10), during the time required. The rotation of the cam continuing, it will raise the lever into its former position, and open the valve to admit the steam. There being two branch steam pipes to supply both cylinders, and a valve in each, and the cams and levers so regulated, that as the one valve is closed shutting off the steam from its cylinder, the other is opened and admits the steam into the cylinder, to act upon its piston, and thus gives a continuous rotatory motion to the main axle of the engine. Another regulating valve, which may be used in place of the ordinary throttle valve of the engine, is shewn at figs. 11, and 12, and consists of a plate *u*, fixed across the steam pipe, having two holes *w*, *w*, made through it, of equal dimensions; these holes are closed

so as to prevent the passage of steam by two valves *x*, *x*, one of which closes on the upper side of the plate, and the other on the under. These valves are connected together by the bent arms *y*, *y*, which are fixed on the axle *z*; this axle is placed across the pipe, and projects out at the side, where a lever may be affixed and worked by a cam on the axle, as before described. It will be understood that these valves may be so adjusted as to regulate the admission of the steam into the cylindrical chambers as desired, and the steam may be cut off, and the valves kept closed at any required part of the revolution of the piston, and the expansive force of the steam used to continue its rotation.

"Although I have described steam only as acting upon the pistons of the engine in the foregoing description, yet I wish it to be understood that the actuating or motive power to work such engines may be the gravity of water, the expansion force of steam, gas, or condensed air, or any other elastic vapour.

"The same principles described under my rotatory engine, will apply to the construction of rotatory bellows, or blowing machines, by which a continued blast may be kept up.

"Figs. 13, 14, and 15, are representations of such blowing apparatus. Figs. 13, and 14, are sections, shewing the parts in different positions; and fig. 15, a top or bird's eye view of the outside; *a*, is the case or cylinder, in which the piston *b*, revolves; *c*, is the aperture for the admission of air into the cylinder; *d*, is the valve or stop which divides the air aperture from the exit pipe *e*; *f*, is the axle of the piston, having a winch handle *g*, on its end. On a rotatory motion being communicated to the axle by the winch handle, or any other means in the direction of the arrow, the piston will be carried round, forcing the air before it out of the cylinder through the exit

pipe *e*. As the piston revolves, the wiper on the piston coming in contact with the curved end of the stop valve, raises it, as shewn in fig. 14, and the piston is allowed to pass when the stop falls down again, to be ready for the next revolution of the piston. The exit pipe *e*, is connected to a box or air chamber *h*, into which its end is open, when the air is being forced out of the cylinder, and through the nozzle or pipe *i*, leading to the furnace. On the blast ceasing, the valve *k*, closes the end of the pipe. At this time the piston in the other cylinder *l*, (see fig. 15), is acting upon the air, and forcing it out through the pipe *m*, into the air chamber, as before; thus keeping up a continuous blast: the valves at the end of the pipes in the air chamber alternately opening and closing, as the piston of either cylinder comes into operation."—[*Inrolled in the Petty Bag Office, Oct.* 1830.]

Specification drawn by Mr. Newton.

To JOHN KNOWLES, *of Farnham, in the county of Surrey, Hop Planter, for his invention of a certain instrument or machine, for drawing hop poles out of the ground previous to picking the hops, and which by drawing the poles perpendicularly will greatly save them, as well as prevent the hops from being bruised; called a hop drawer, by a lever and fulcrum.*—[Sealed August 13, 1830.]

THIS invention is intended to prevent the injury done to hops in the common method of drawing out of the ground the poles, round which the hops are trained. The hop poles, in the usual way of drawing them, are shaken or moved backwards and forwards, in order to loosen them

in the ground, and are necessarily forced against the other poles to the injury of the hops, which become bruised and broken off; the poles likewise are often much injured and broken near the ground, which inconveniences are proposed to be obviated by this invention.

The apparatus consists of a lever having one end formed into a long handle, and the other end branched into the shape of a fork, with teeth or notches at the inner parts of the fork, for the purpose of taking fast hold of the hop pole. This lever has its fulcrum in a leg or crutch, to which it is attached by a pin and hinge joint, the leg being carried about with the lever when in use.

The forked end of the lever is to be applied to the pole intended to be drawn out of the ground, and the teeth or rough notches in the prongs of the lever prevent the pole from slipping through, when the instrument is applied to draw a pole out of the ground.

The leg or crutch in which the fulcrum of the lever is fixed is made with an enlarged end or foot, to prevent its being forced into the ground by the pressure required to overcome the resistance of the poles when drawing.

Figures 16, 17, and 18, Plate IV. are representations of the apparatus or machine. Fig. 16, is a plan or horizontal view, looking on the top. Fig. 17, is a side view of the same in the position the instrument is when applied to a hop pole, in order to draw it out of the ground; and fig. 18, is another side view of the instrument taken when the handle of the lever has been depressed, and the shorter or forked end raised, and with it the hop pole; *a, a,* is the lever with its forked or branched arms *b, b,* having the teeth or notches *c, c,* on the inside; *d,* is the crutch or leg, the fulcrum *e,* of the lever bearing on the top. The lower part of this crutch is enlarged as at *f,*

and is shod or covered at its end with an iron plate, where there is also a spike or pin fixed to prevent it from slipping when the power is applied to raise the hop pole out of the ground.

The method of applying this instrument is so fully shewn by the figures, that it is scarcely necessary to describe the manner of its action. The forked end of the lever is to be brought into contact with a hop pole near the ground, with the longer end or handle raised, and the fork taking hold of the hop pole, as low down as may be thought proper, the longer end or handle is then to be depressed, keeping the forked end in contact with the pole, with a slight pressure, when as the short end of the lever rises, the pole will be drawn out of the ground in a perpendicular direction, without shaking the hops; the joint at the fulcrum on the leg allowing the lever and crutch to accommodate themselves, to the motion of the pole as it rises.—[*Inrolled in the Rolls Chapel Office, October,* 1830.]

To Samuel Wright, *of Shelton, in the Staffordshire Potteries, for his invention of a manufacture of ornamental tiles, bricks, and quarries, for floors, pavements, and other purposes.*—[Sealed 26th Jan. 1830.]

The Patentee says that his invention consists, in the first instance, in the manufacture of tiles, bricks, and quarries, in various shapes and sizes, from the *finer* clays, and other materials used for making porcelain and earthenware, and not from the coarser materials hitherto used for such purposes; and in combining such materials, and so firing them, as to produce a hard solid semi-vitrified substance, more durable than stone or marble.

In the second place, in ornamenting such tiles, bricks, and quarries with various colours and patterns, similar to the patterns on carpets, and oil-cloths; or representations of coats of arms, or crests; or imitating marbles, or Roman tessellated pavements, or any other fancy patterns, by impressing the intended patterns or figures upon the tiles, bricks, and quarries, previously to firing them, and afterwards filling up, or in-laying the parts so impressed with clays and other materials, previously prepared and coloured with metallic oxides.

The manner in which the said patterns or figures are to be impressed, is by forming them in moulds of plaster of Paris, which moulds are imbedded or inclosed in metal cases, whereby the plaster moulds are protected from injury, and are enabled to bear a great degree of pressure, and consequently to indent very clear and perfect impressions.

After the impressions have been filled up or inlaid with the coloured clays, and substances before mentioned, and after the tiles, bricks, and quarries have acquired a proper degree of dryness for the purpose, they are reduced to an equable and exact thickness in a machine, and cut or pared by a cutting instrument, worked upon the frame of the machine, whereby the upper surface is gradually planed down to a clean and distinct exhibition of the pattern, and both the upper and lower surfaces are rendered exact and smooth, and thus capable of forming a perfectly level floor or pavement.

The machine consists of a square cast iron box, the uppermost edges of which have steel plates fastened on them, to prevent their being worn away by the cutting instrument passing over them; and within the box is a brass plate, forming a platform, upon which the bricks, tiles, or quarries are placed, to be planed or cut.

At each corner of the platform there is a female screw, through which an upright male screw works, with a small cog wheel fixed to it; these wheels are simultaneously turned by one central wheel, placed on an upright shaft, which is driven by a winch.

The platform and steel edges of the box are to be ground together, in order to render them perfectly level; when by turning the winch, the platform will be raised or lowered with its surface exactly parallel with the edges of the box, by which the stroke of the cutting instrument is governed. Although this effect is very easily produced by using the winch, yet no degree of pressure upon the platform will, of itself, lower its elevation, and consequently the exact thickness of the tiles, bricks, and quarries, can never be accidentally varied.—[*Inrolled in the Petty Bag Office, July,* 1830.]

To JOHN PATERSON REID, *of Glasgow, Merchant, and Manufacturer, for his invention of an improvement or improvements on power looms, for weaving cloth, of various kinds.*—[Sealed 4th April, 1827.]

IN the manual operation of weaving by the ordinary hand loom, the workman swings the vibrating batten to and fro upon its centres, for the purpose of enabling him, first, to drive the shuttle across between the open sheds of the warp threads; and, secondly, to beat up the shoot or weft thread, so as to render the texture of the cloth close and firm. The same is required to be done by machinery, in the power loom, and the object of the invention above recited is for this purpose,

Plate IV. fig. 19, is an end elevation of a power loom, with the present improvement adapted; *a, a,* are the

standards, or end frames of the loom; *b*, is the batten, with the reed and shuttle *c*. The batten in this instance, does not vibrate upon centres as usual, but slides to and fro in horizontal directions, by means of guide rods *d*, which pass between guide rollers *e*, *e*. This however is not absolutely essential to the invention, as a vibrating batten may be employed, instead of a sliding batten.

The warp threads wound upon the beam *f*, are passed over the tension roller *g*, and through the reed of the batten at *c*, to the breast *h*, and near that point the cloth is made by the intervention of the warp and weft threads, which are here beaten up, by the advance of the reed.

The to and fro motion of the batten, carrying the reed, is usually effected in a power loom by a rotary crank; but, in this improved loom the batten is actuated by an arm *i*, connected to an excentric wheel *k*, *k*, at one end, and to a spring *l*, fixed to the under side of the batten at the other end. This excentric wheel turns upon an axle, at *m*, and as it revolves, its periphery acts against a friction roller *n*, at the end of the batten, in order to guide the batten steadily as it advances and recedes.

When the smaller radius of the wheel *k*, is in contact with the roller *n*, the batten is brought back, which is the time that the shuttle is projected across between the sheds of the warp; the wheel is therefore made with this part of its periphery nearly concentric, in order that it may continue revolving without advancing the batten, until the shuttle has got clearly through the warp, and become lodged in its box, at the end of the shutter race. The opposite radius of the excentric wheel is large, in order to push forward the batten with considerable force, which is requisite in beating up the weft thread.

It will hence be perceived that the excentric wheel *k*, and the arm *i*, act together in giving the to and fro sliding

motion to the batten; but, as some degree of elasticity is necessary in beating up the weft, in order to prevent the warp threads from breaking, the rod *i*, as before said is attached to a spring *l*, which allows the batten to recede a little, when driven up with force.

This spring *l*, may be made in any way that shall be found eligible; a long rod fastened at one end only to the under side of the batten is preferred, and which by being adjusted, may have its elastic force increased or diminished according to the quality of the work to be made.

Various parts of the power loom shewn in the figure above referred to are not new, but are employed in conjunction with the improvement, it is therefore to be observed that the only features of novelty claimed by the Patentee, is the excentric wheel, or any other description of cam, or wiper, which may be capable of actuating the batten; and the spring, or elastic attachment of the conneeting arm, by which the batten is impelled in beating up the weft.—[*Inrolled in the Inrolment Office, October*, 1827.]

To George Harris, *of Brompton Crescent, in the county of Middlesex, Captain in the Royal Navy, for improvements in the manufacture of ropes, and cordage, canvas, and other fabrics or articles, from substances hitherto unused for that purpose.*—[Sealed 15th September, 1829.]

The object of this invention is to produce a rope, or sail cloth, which shall be impervious to water.

The Patentee proposes to employ as the substance of his improved ropes or cordage, a vegetable production, called *silk grass*, which when dried is to be beaten and heckled in the same manner that flax or hemp is usually prepared. In the process of preparing the grass, it is proposed to

introduce a bituminous and gummy material, which is intended to saturate the fibres of the grass, for the purpose of preserving the ropes, cordage or sail cloth, or any other fabric made from it, when exposed to the effects of damp.

This gummy material is to be compounded of the milk of a tree called the *ficus indica,* with *asphultum,* or *bitumen judaicum,* and *cocoa nut oil.* The proportions are to about twenty five gallons of the milk, one gallon of the oil, and from one to twenty gallons of the bitumen, according to circumstances.

These substances when properly combined, which may be done over a slow fire, constitute a gummy material, into which the fibres of the grass may be dipped while heckling, and it also may be applied in twisting or spinning. It is likewise proposed that the workmen in twisting the strands of cord, shall dip their hands in the material, and work it well into the fibres and texture of the rope.

When this gummy material has become dry, it will resist water, and prevent the rotting effects of damp upon the fibres of the rope, cordage, sail cloth, or other articles manufactured from it.—[*Inrolled in the Petty Bag Office, March,* 1830.]

To HENRY KNIGHT, *of Birmingham, in the county of Warwick, Clock-maker for his invention of a machine, apparatus, or method for ascertaining the attendance to duty, of any watchman, workman, or other person; which machine, apparatus, or method, is applicable to other purposes.*—[Sealed 28th April, 1827.]

THIS contrivance is to be connected to a clock, and consists principally in a lever with a string, which being pulled by the watchman every time that he goes his rounds,

causes a mark to be made with a pencil, or marker upon a dial plate, corresponding to the precise time of the night when the string was pulled; by which means the master, on afterwards looking at the face of the clock, may perceive at once on how many occasions the string has been pulled, and at what precise times; so that if the watchman has neglected to go his round with regularity, such neglect will be shewn upon the face of the dial.

Plate III. fig. 6, is a side view of the apparatus; *a, a,* is the frame work of the clock, the works of which need not be shewn; *b,* is the arbor or axle supposed to carry the hour hand; *c,* is the dial plate made circular, with the hours and quarters depicted upon it; this dial plate is affixed to the arbor *b,* by a finger screw *d,* and of consequence revolves with the arbor, instead of an hour hand: the index being stationary at *e,* above. A lever *f,* is mounted upon an axle at *g,* and to the tail of this lever the string *h,* is attached.

Whenever the string *h,* is pulled, which it is intended the watchman shall do every time that he passes the clock in going his rounds, the reverse end of the lever will rise, and with it the index *e,* which having a pencil placed in it, will make a straight mark upon the face of the dial plate, near the edge, against the hour, or quarter, at which the string was pulled; and on the string being released, the spring *i,* will force the lever back again to its former quiescent position.

As the dial plate continues going round, the next time that the watchman pulls the string, a mark will be made upon the dial plate in another place, indicating the time as before; and so on a succession of marks will be made, which on inspecting the dial plate the next morning, will shew whether the watchman has attended his duty regularly.

In order that the plate of the real dial may not be de-

faced by the marks, it is proposed to substitute a temporary, slate, dial plate, to be affixed to the arbor *b*, in contact with the real dial plate: a little larger in diameter, and extending on the outside of the real plate. This temporary dial plate may be of paper, and attached in the same way, by a finger screw, to the going arbor or axle *b*; and a series of them being provided, one for every night, and dated, by preserving the paper dials, a register of the watchman's attendances may be kept for any length of time.

In order that the trouble of repeatedly pointing, a pencil may be avoided, it is proposed to put a small roller of metal, in place of the marker *e*, which will give a sufficiently evident mark upon the paper; and that the marker may be kept in contact with the paper as it moves up and down, a small spring is attached to the end of the lever at *k*. The dial may be secured within the house, and the string of the lever be carried to the outside by small cranks.—[*Inrolled in the Inrolment Office, October,* 1827.]

To THOMAS CLARKE, *of Market Harborough, in the county of Leicester, Carpet and Worsted Manufacturer, for his invention of certain improvements in manufacturing carpets.*—[Sealed 26th May, 1827.]

THE Patentee considers that there are two points of invention which he may claim under this patent; the first, is a superior quality of Venetian carpeting; the other an improved mode of weaving it.

In the first instance, it is proposed to employ a greater number of worsted threads in a given space, than has heretofore been employed in making a Venetian carpeting; and also to extend the pattern, as of a flower, much wider than heretofore; indeed one subject or pattern may extend the whole width of the carpet, if required, without

repetition: which in that description of goods, has never been done before.

In the second place, the French figure weaving loom, called the Jacquard, or Lyons loom, is employed, but with some improvements. In order therefore to understand the improvements, it will be necessary to examine the construction and principles of the Jacquard loom, which is particularly described in the First Series of our Journal, Vol. II. under Lambert's Patent, page 95, and Wilson's Patent, page 255.

In the Jacquard loom there are several rows of hooks with rods attached to the warp threads, certain of which rods are to be raised at every throw of the shuttle, for the purpose of lifting certain parts of the warp, to produce the required pattern; which rods are acted upon by a series of cards, or boards, pierced with holes in certain parts, and blank in others (previously regulated by the pattern drawer) in place of the old mode of lifting the warps by a draw-boy.

The Patentee proposes to employ double rows of hooked rods, the hooks standing in opposite directions; which will enable him to put a much greater number of warp threads in operation, and to produce larger patterns, without increasing the weight of the operative parts of his carpet looms. It will be necessary in this contrivance to employ double sets of cards, or boards, acting together, the holes or perforations and blanks of which corresponding cards, shall be the reverse of each other, that is the situations of the perforations in one card, shall be occupied by blanks in the other, and *vice versa*; consequently there must be two revolving hollow lantern rollers to guide the two sets of cards. By this contrivance the loom may be worked with one treadle instead of two.—[*Inrolled in the Inrolment Office, Sept.* 1827.]

To CHARLES PHILLIPS, *of Rochester, in the county of Kent, Captain in our Royal Navy, for his invention of certain improvements on capstans:*—[Sealed 8th June, 1827.]

CAPTAIN PHILLIPS obtained a patent in September, 1819, for improvements on capstans, upon the basis of which original invention the present improvements are founded. In the former instance (see the second volume of our First Series,) it was stated, that the evident want of power in the usual mode of weighing anchors, led the inventor to devise a means of overcoming that difficulty; and aware that mechanical power might be obtained in many ways, his principal study was simplicity, and the adaptation of such means as could be used with the greatest convenience at sea, and which mariners in the darkest night could not by any possibility mistake in applying.

The leading features of that invention were the introduction of a series of toothed wheels, and a toothed ring at the lower part of a double capstan, which produced what is commonly called a sun and planet motion. By means of this gear on turning the capstan below deck, the upper capstan upon deck, which was mounted upon the same axle, was made to turn slowly, but with greatly increased power; by which means the assistance of a few men below very materially aided the exertions of those upon deck, and the anchor could be raised with comparative ease, although there might be a scarcity of hands capable of being brought to the work.

In the former invention, the barrel of the lower capstan turned loosely upon the upright shaft, on which the upper capstan was fixed, and when the lower capstan was bolted to the gear work, and driven round, the gear caused the shaft carrying the upper capstan to turn with increased mechanical power. As however it was not ne-

cessary at all times to work the capstan with that increased power, there was a mode of connecting the barrel of the lower capstan to the central shaft, or of detaching it from the shaft when required, by means of a sliding clutch box, which fitted into a square part of the central shaft, and secured the barrel of the capstan and the shaft together.

The object of the present invention is to dispense with the said clutch box, which being raised and lowered by levers was found rather too complicated to suit the habits of seamen. It is therefore now proposed instead of the clutch box, to affix a loose drum head to the central shaft, and to connect this drum head to the barrel of the capstan when required, by means of bolts or pins.

Plate III. fig. 5, shews the double capstan, with the gear below to obtain power, as in the former invention. The lower capstan is represented in section, in order to exhibit the manner in which the detached drum head is occasionally connected to the barrel: *a*, *a*, is the barrel; *b*, the central shaft; *c*, *c*, the drum head; *d*, *d*, are bolts, which being lowered into the recesses in the barrel, lock the drum head and the barrel together; but when it is required to detach them, the bolts may be raised up so as to disconnect the two parts of the capstan.

The bolts have each a pin introduced into their side, or passed through them, which pin, when the bolt is raised, and turned round, rests upon a ledge or aperture in the drum head, and thereby the bolt is retained, and prevented from falling down into the recess of the capstan barrel, so as to lock it; and also renders it unnecessary to remove the bolt from the drum head, which might if withdrawn be mislaid or lost.

The Patentee states that it is not absolutely necessary to employ a drum head detached from the barrel of the cap-

stan, as a block, or two bars combined, and securely attached to the central shaft, with similar bolts passed through, might be substituted in place of the detached drum head, and answer the purpose perhaps equally well. —[*Inrolled in the Inrolment Office, December* 1827.]

To JOHN WRIGHT, *late of Princes-street, Leicester-square, but now of Jobbin's-court, Knightsbridge, in the county of Middlesex, Engineer, for his invention of certain improvements in window sashes*—[Sealed 11th October, 1827.]

THESE improvements are intended to be adapted to that description of window frames, called French casements, and are designed for the purpose of preventing the wind and rain from insinuating under the window frame, at the sill.

A groove is formed in the sill, extending the whole length of the window, in which a horizontal bar is placed upon vibrating levers, that allow it to be raised or lowered. When the window frame is closed and fastened, a perpendicular slide bolt presses upon the ends of the levers, and causes the bar or horizontal bolt to be raised, which, is by that means introduced into a groove in the under part of the bottom rail of the casement, and the window becomes securely locked.

Plate III, fig. 7, is a section of the sill, and the window frame or casement taken transversely; *a, a,* is the sill of the window; *b,* the lower rail of the casement, in which *c,* is the notch for the bolt to pass into, and *d,* is the bolt or horizontal bar, in its depressed state.

Fig. 8, is a longitudinal section of the bar *d,* which is made hollow, for the purpose of introducing the levers

e, e. These levers are mounted upon axles, at *f, f,* which have their bearings in the bottom of the groove, and when the perpendicular bolt *g,* is slidden down, as in fastening the window; it causes a pin at *h,* to press upon the ends of the levers in the centre of the bar, and to depress those ends, at the same time raising the outer ends of the levers *e, e,* which lift the bar *d,* up into the notch or groove *c,* in the lower rail of the window frame.

Fig. 9, shews a transverse section of the sill and the window frame, as fig. 7; but in this instance the perpendicular bolt *g,* is depressed (the window being fastened), and consequently the horizontal bar *d,* is raised up into the notch *c,* and wind and rain are prevented from passing under the window frame into the room.

The Patentee claims the raising and depressing of the horizontal bar upon levers, for the purpose of locking the window, and keeping it weather tight, but he does not claim the perpendicular bolt, which has been employed before, though not for the same purpose.—[*Inrolled in the Inrolment Office, April,* 1828.]

To MAURICE DE JONGH, *of Warrington, in the county of Lancaster, Cotton Spinner, for his invention of an improvement, or improvements in machines adopted for spinning, doubling, twisting, roving, or preparing cotton, and other fibrous substances.*—[Sealed 4th December, 1827.]

THESE improvements are founded upon the Patentee's previous inventions, of combinations of mechanism, to produce a self-spinning mule; or a similar kind of spinning machinery: for which inventions, patents were granted in March 1825, and December 1826; the specifications of

which are reported in the Thirteenth Volume of our First Series, and the First Volume of our Second Series. In both these instances we set out the whole of the machinery, and explained all the parts, of which the specification of the present patent is in a great degree a repetition, but with the recent improvements added thereto.

The specification is extremely long, and is accompanied with several sheets of drawings, containing numerous figures of the minute parts of the machinery; we have therefore endeavoured to extract such portions of the subject, as would explain the points of novelty at present claimed; but by the explanation, the improvements appear to be so essentially involved in the whole construction of the machine, that we find ourselves unable to give any thing like an intelligible description of the present improvements; and can only say, that they refer principally to the means of driving the machinery, and of throwing it in and out of gear, and to the tempering, or qualifying of the several movements of the mechanism; in order to render the taking up, or winding of the yarns into the spindles, or cops, uniform under all circumstances, from the beginning to the end of the operation; that is until the cops are wound full, and ready to be removed from the mule.—[*Inrolled in the Inrolment Office, June,* 1828.]

To William Fawcett, *of Liverpool, in the county of Lancaster, Engineer, and* Matthew Clark, *of the island of Jamaica, Engineer, for their invention of an improved apparatus for the better crystallization of sugar from the canes.*—[Sealed 4th December, 1825.]

The leading feature of this invention is the application of high pressure steam to the external surfac[e] of sugar-pans

or vessels in which the cane-juice is boiled, for the purpose of concentrating its crystals, that is, evaporating the aqueous parts from the sugar.

Any peculiar form or disposition of the vessels does not appear to be essential; but such an arrangement must be adopted, as will allow of the steam from a high pressure boiler to be brought in contact with, or surround the several pans in which the molasses or cane-juice is placed for evaporation.

It is proposed to construct a very strong steam-boiler of wrought or cast-iron, having the furnace and flues within surrounded by the water, so that little or no heat may be lost by radiation. This boiler is to be proved to bear the resistance of steam at a pressure considerably greater than it will ever be required to be employed, and safety-valves are to be placed in suitable situations, to prevent explosion. On the top of this boiler the sugar-pans are to be mounted, with jackets surrounding their lower surfaces, connected by flanges packed steam-tight. From the boiler, pipes are to be laid, for the purpose of conducting the high-pressure steam into the spaces between the pans and their jackets, the heat of which will cause the molasses, or cane-juice in the pans to boil, without subjecting it to burning, or baking on to the internal surface of the pan.

The pans may be connected in any other way with a generator of high-pressure steam, which steam may be conducted under the pans by pipes or other means, and the steam-boiler or generator may be employed at the same time to drive the engine, or other machinery connected with the sugar-works.

The ends of the flues in the boiler are to discharge themselves into other flues leading to the chimney, but they must be furnished with dampers, to prevent the heat from passing away too freely; and additional pans may be

placed in connexion with the chimney or flues, by which the heat of the vapour and smoke may assist in preparing the liquor for the crystallizing process,

[*Inrolled in the Petty Bag Office, June,* 1828.]

To MATTHEW FULLWOOD, junior, *of Stratford, in the county of Essex, Gentleman, for his invention of a cement mastic, or composition, which he intends to denominate German Cement.*—[Sealed 6th May, 1828.]

THE materials of which this cement is to be made are a Gloucestershire stone, commonly called Painswick Rag; another stone, from the same county, called Bisley Stone; and black rock, from the neighbourhood of Bristol and Clifton.

These stones, in the proportionate quantities of a ton of Painswick Rag, half a ton of Bisley Stone, and one ton of black rock, are to be broken into small pieces, mixed together, and burnt; the material may then be ground, and made up into cement with water, and when dry, will be found to be hard and durable, and something lighter in colour than Roman mastic. This colour may be rendered still lighter by additional burning.

[*Inrolled in the Petty Bag Office, July,* 1828.]

To JOHN BARTLET, *of Chard, in the county of Somerset, shoe-thread-manufacturer, for his invention of a new and improved method, or methods, of manufacturing process, for preparing flax, thread, or yarn, for use in the manufacture of boots, shoes, saddlery, and of sails and sail-cloths and bagging.* [Sealed 16th June, 1828.]

THE mode of preparing the flax threads or yarns for the use of shoe-makers, saddlers, and sail-makers, proposed

by the Patentee, is by immersing the threads in a strong solution of oak bark, made hot. The degree of strength is not mentioned, nor the time requisite for the threads to be immersed. One steeping, it is said, will be sufficient to harden and strengthen the fibres of the thread, and render it very durable.

[*Inrolled in the Petty Bag Office, August,* 1828.]

Novel Inventions.

Galloway's Smoke Consuming Furnace,

In the number of our Journal for September last, Vol. V. (Second Series), page 340, we gave the Specification of Cochrane and Galloway's patent for their smoke consuming furnace, but as several important improvements and variations in the details of the invention, have been made since the original Specification was inrolled, we feel it incumbent upon us to furnish a few additional particulars illustrative of its present improved state.

We need hardly say that oxygen is essential to combustion, and as such, that the greater the supply of that gas to any mass of burning fuel, the more rapid will be its combustion and operation in eliciting heat.

Now, a knowledge of this fact will serve to illustrate one of the most important features in the furnace before us; viz. instead of trusting to the ordinary supply of atmospheric air, Mr. Galloway produces an artificial blast with bellows of any of the ordinary kinds, and by the aid of an air tight furnace, brings the whole of the air thus compressed into contact with the burning fuel. By this arrangement a small furnace is made to supply

the place of the unwieldy grates hitherto employed for steam engines ; an achievement of the greatest importance in the construction of loco-motive engines for rail roads.

The second, but by no means less valuable featured, in Mr. Galloway's invention, is the contrivance by which it is rendered a *complete smoke consuming furnace*. We have seen the fuel repeatedly supplied, and that too in large quantities, without as much smoke being discharged as would have proceeded from an ordinary drawing room fire. Instead of a torrent of unconsumed carburetted hydrogen and soot, arising from the chimney, as is usually the case, by the abundant supply of oxygen, to which we have already alluded, the whole vapour is converted into so much useful fuel, and a very great advantage on the score of economy is the result.

Fig. 10. Plate III, is a view of the complete apparatus in section, as it is now employed in Mr. Galloway's factory, in West Street, Smithfield. The furnace and flues *a, a, a,* are surrounded by the water contained in the boiler *b,* so that the heat lost by radiation is reduced to the smallest possible amount ; *c,* is the ash pit, which may be considered as air-tight, with regard to the external atmosphere ; *d,* the air service-pipe, proceeding from a pair of bellows worked by the engine. The air, on entering the ash pit, is distributed beneath the furnace bars, and passing between them becomes combined with the burning fuel, and thereby produces the most intense ignition. A small branch pipe at *e,* serves to add to the effect of the first arrangement, and by carrying in a current of air on the top, ensures the combustion of the smoke ; *f,* is a valve or air-tight door, with a cavity in it, containing water ; the door is furnished with a screw, and bridge, to bring it in perfect contact with the seat

round the aperture of the furnace mouth, in which it rests.

The coal or other fuel is introduced into the hopper *g*, by raising the valve and lever represented above. The fuel then rests on the slide *h*, which, to discharge it into the furnace, is removed by the aid of a pinion and rack, so that when the coal is introduced into the hopper, the slider *h*, is closed air-tight, and when discharged into the furnace, the upper valve is closed, keeping the furnace perpetually air-tight at the upper part.

The mode of cleaning the flue is perfectly simple, and has a great advantage over those in general use, as it will be seen by a reference to the figure, that the engine man has only to remove the caps *i, i*, and he may at once, with perfect ease, gain access for that purpose.

AMERICAN PATENTS.

(From the Franklin Journal)

A Self-moving Cradle.—Anthony Buchenberger, *New York.*

A common swinging cradle is to be made to vibrate by a spring movement, like that of a time-piece, which is to be let into one of the uprights, and of this movement the cradle becomes the pendulum.

The claim is to " the method of working a cradle, and the adaptation of the movement above described."

In the days when cradles were as numerous as infants, and swaddling-bands and chin-stays were accounted necessary to preserve the juxta position of the joints, it was frequently proposed to rock the child to sleep by clock-work, and we have little doubt that it has actually and repeatedly been carried into practice; at all events, the proposition of the matrons and the nurses is now to be realized, and our children are to be made to sleep against

time, provided their parents consent to it. We are very apprehensive, however, that the determined departure of the moderns from the usages of primitive times, will interfere with the patent mode of inducing sleep, and prevent its becoming a profitable concern.

An Improvement in the Manufacturing of Chandeliers, by the Crystallization of Salts upon their Frames.—FRANKLIN RANSOM, *Buffaloe, Erie County, New York.*

A PATENT was granted on the 13th of June last, to F. B. Merrill, of Buffaloe, for ornamenting the skeletons of chandeliers, &c. by immersing them in a saturated solution of alum, or other salt; chandeliers, so ornamented, being intended as cheap substitutes for those of cut glass. The present patent is obtained for the same thing precisely, and both the inventors, or discoverers, reside in the same town; which of them invented or discovered it first, or whether they discovered it originally in a chemist's laboratory or a lady's boudoir, we are not informed. Ornaments of this description were familiar objects in our boyish days, some time back, in the last century; although it had then been discovered that crystals would attach themselves to twigs interwoven in the form of baskets, grottoes, and pyramids,—the knowledge that sticks or wires, bent in the shape of the frame of a chandelier, was, it seems, reserved to become one of the notable improvements of the present day.

A new and useful Machine for winding up Clocks, called "Ward's Self-moving Power."—RICHARD WARD, *Waterbury, New Haven County, Connecticut.*

WITHOUT attempting a critical analysis of the name, "a self-moving power," which appears to us rather incongruous, we will at once proceed to a short description of the winding apparatus intended to be applied to a clock. Air, like other bodies, is expanded by heat and contracted by cold; it is proposed to use the expansion and contraction of this fluid, by natural changes of temperature, to keep a clock perpetually wound up.

An air chest, or reservoir, of the capacity of four or five gallons, it is estimated by the patentee, will be sufficient for a time-piece with a striking movement. A tube is to pass from this air-chest into a small gasometer, constructed with three concentric cylinders, precisely like those used for gases by the chemist. When the air expands in the chest, it is forced through the tube, and raises the middle cylinder of the gasometer, and when it contracts, the cylinder consequently falls. This cylinder is so suspended, that a cord or catgut, which passes over a pulley, turns a drum or barrel, and winds the clock, whether ascending or descending. The particular modes of effecting this, described by the patentee, we shall not detail; those conversant with machinery will be at no loss in perceiving how this may be done.

That a delicately made time-piece may be wound up by the expansion and contraction of fluids or solids from natural changes of temperature, is an admitted fact; but we will take this opportunity of making the following remarks upon the subject of the application of some of the moving objects in nature. Some of these may be employed to keep clocks and other engines wound up, so that their action shall be continued. The contractions and expansions of a long bar of metal, from changing temperature, the rise and fall of mercury in the barometer, the perpetual current of rivers, the flux and reflux of the tide, regular and irregular winds, and drafts or currents of air, the hygrometric changes in certain substances, are of the kind intended; the employment of some of them is familiar, and the possibility of using the whole of them, as well as some others which have not been enumerated, will be evident to most of our readers.

The possibility, and eligibility of a thing, are, however, very distinct questions; in machines for which patents are obtained, and which, of course, are expected to yield a profit to the patentee, the latter is the only point of importance; we apprehend that the present plan, like many of its predecessors, will fail to recommend itself by its actual utility, so as to repay the patentee for his expenditures of time and money.

An improved Cooking Stove. Joseph Hurd, jun. *Boston, Massachusetts.*

This improvement consists in the combination of a furnace and oven, partially or wholly surrounded by polished tin, or other metal, as reflectors; and a boiler which is set upon the oven, and is so constructed that it receives into a cavity, or chamber, at its bottom, the smoke and hot air from the furnace which previously passes around the oven.

Also the application of tin or other polished metal, to serve as a reflector around, or partially around, the furnace of a boiler, by means of which a great portion of that heat is saved, and applied particularly to objects for which it is wanted, which must be lost by radiation or absorption, when the fire is made on brick work or in common iron stoves.

Likewise the application of tin, or other polished metal, arranged around, or partially around an oven, which will reflect back upon it the heat which would otherwise be lost by radiation or absorption, according to the material made use of.

An Improved Boiler.—Joseph Hurd, jun. *Boston, Massachusetts.*

This improvement consists principally in having a chamber, or cavity, at the bottom of the boiler, which receives all the smoke and hot air from the furnace, and from which all external air is excluded. It has a flue, or pipe, through the side, to carry off the smoke into the chimney, or elsewhere.

We expect shortly to see the inventions to which the four preceding patents refer, in actual operation, and are prepared to place them on the list of real improvements; at all events they appear to be founded upon correct scientific principles, and we hope that the test of experiment may show that these principles are well applied. It is probable that a full account of them will hereafter appear in the Journal.

An improved Stereotype Plate.—Nathan Hale, *Boston, Massachusetts.*

The improved plate is intended for maps, and other subjects in which drawing and lettering are combined. Blank type, quadrats, or spaces, are to be cast of the usual height of type, so that when set up, they will stand even with the face of the letter. These are to be set by the compositor with the required names standing in their proper places; from this a block is to be cast in the usual way of forming stereotype plates, when the lines of the map, or other drawing, are to be formed by the graver.

The invention claimed as original consists of the union of the lettering and such parts of the cut as are formed by casting, with the blank parts of the same plate, having an even surface, on which other parts of the same map, or drawing, may be formed by engraving; and in an improved stereotype plate formed as herein before described.

REPORT

Of the Select Commitee of the House of Commons on the Laws of Patents.

(Continued from page 371.)

Mr John Farey again called in; and examined.

(Mr. *Farey.*) I was requested, on a former occasion, to illustrate my recommendation as to two kinds of successive specifications, by preparing some papers for the Committee, as a specimen of the process by which I proposed that patents should be granted. The paper I hold in my hand, is what I consider Mr. Watt ought to have communicated to the examiner in confidence, on his first application for his patent in 1768. For this paper I have adopted the words Mr. Watt afterwards used for his specification, but which in my opinion is not a specification, (not being specific.) That communication being rendered intelligible to the examiner, without his exercising any judgment on the value, merit, or practicability of the project, and being definitely worded, and divided into as many distinct articles as it admits of; and being also agreed to, and signed by the inventor, should be folded and indorsed by the examiner,

with a certificate signed by him, and the folded packet should be sealed by the inventor with his own seal.

That sealed packet being left in the possession of the examiner would form an accurate record of what had been communicated to him by the inventor.

A copy of the certificate that is indorsed on the packet should be given to the patentee by the examiner, as his title deeds of invention which he may assign; that copy should be on a printed sheet of instructions to the patentee, to inform him how to proceed, and what is the law on such points as he requires to know, at that stage of his application. I have put down the following articles as my first thoughts of what should be the chief points of law and regulation; but I wish it to be understood, that I present this paper only by way of illustration of the principles that I have recommended; and that I have not given the necessary time to study and consider the following articles so maturely, as to feel confident that I shall not see reason to alter and amend them at leisure.

Public notice should be immediately given of the application by advertisements in the Gazette, and in such of the principal newspapers as the examiner thinks most proper, in the districts where the trade to which the invention relates is most extensively practised.

If in consequence of such notice, any oppositions are offered, on the ground that it is not a new invention, or has been surreptitiously obtained, the examiner is to hear and decide upon them. If he requires to open the sealed packet for re-examination on such hearings, the applicant to have notice, that he or his agent may be present, and may seal it up again himself.

Within three months of the date of the deposit, the patentee must get his specification examined, completed, approved, and inrolled, so that it may be transcribed into the patent that it is to be granted with that date. But if he shews good cause, why he is not then prepared to specify, the examiner, at his own discretion, may grant more time, not exceeding three months, on condition that the patentee delivers an outline of what specification he proposes to give in, as soon as he can make it; also, making his election of those particular articles, together with the outline of the specification relating to them, to be made public; he shall then be protected against publications during the extended time; and the other secret articles he may withdraw.

And on shewing good cause why such additional time should be again extended, a further extension may be made, not exceeding twelve months more. The propriety of allowing such extensions, and the time of it, to be settled by award of asses-

sors, one appointed by the examiner, the other by the applicant; these assessors choosing an umpire, and proceeding on the principle of equitable arbitration between the public, and the inventor.

By way of example, I have sketched out the records of such proceedings as would have taken place on Mr. Watt's application, if the regulations that I recommend, had been then in force; and also I have drawn up, as an example for a specification, a brief description of the first steam engine that Mr. Watt did get to work properly about 1773.

Are you aware of the expenses which have been incurred on trials of patent rights?—I know them to be very expensive, and to amount, usually, to more than 600*l.* for each party. Mr. Daniell's costs in defending the *scire facias* by which his patent was set aside, was 750*l.* I have not preserved notes of the items of the expense of those in which I have been concerned, except of one which I before mentioned to the Committee; it was tried last January in the Court of King's Bench, on Clegg's patent for a gas apparatus; the patentee's costs amounted to 718*l.* for one trial, and the particulars, when summed up, are as follows:—

				£.	s.	d.
Counsel's Fees - - - - -				172	17	0
Witnesses to facts, from the Country -	£.98	14	6			
Ditto Ditto in Town -	10	4	6			
Scientific Witnesses, in support of the Specification - - -	111	2	0	237	10	6
Coffee-house expenses for Witnesses -	17	9	6			
Office Copy of the Specification -	15	16	0	17	19	4
Examining the same - - -	2	3	4			
Expenses of collecting Evidence, including Subpœnas, journey to Leeds, Agents Charges, &c. - about				40	0	0
Drawings - - - - - - -				4	4	0
Court Fees - - - - - -				24	14	0
Proceedings in the Action, Special Jury, Briefs, Documentary Evidence, Letters, Attendances, &c. about				220	15	10
				£.718	0	8

The patentee obtained a verdict; but the above costs were taxed, and the infringer had only 432*l.* of them to pay, leaving the successful patentee much out of pocket; for, in addition to the above costs, several models and machines were constructed for the purpose of showing that all the machines described in the specification, would really operate as there described; and

also for the instruction of counsel, and to exhibit in court. The expense, I am informed was nearly 100*l.*

Will you explain how the necessity arose for so great an expense being incurred, in bringing up witnesses?—From the difficulty of explaining the subject to the court, in the manner that the law requires, and from the necessity of proving all the various facts which were unnecessarily called in question by the rule of law. The specification contained descriptions of several different distinct apparatus and machines to be used in concert, forming a complete gas apparatus for gas-lighting; every part of this apparatus was executed at first, and was then thought very advantageous; but the different parts of which it consisted, have gone out of use one by one, as they have been superseded by cheaper or better apparatus; the machines called the gas-meter and the governor, have been brought into very extensive use, and have proved valuable inventions, when executed in an improved form, by Mr. Crossley (who purchased the patent of Mr. Clegg, the inventor,) and who has established a considerable manufactory of gas-meters. It was for infringements on that part of the patent right, that the action was brought. The law requires the patentee to prove the novelty, the utility, and the sufficiency of the specification, for every one of the improvements described in the specification; hence it was necessary to give evidence respecting such apparatus as had been in use ten years before in different parts of the kingdom, but which has since been laid aside, and to prove their novelty, their success at the time, and the causes why they went out of use, that they were not positively deficient inventions at the time of granting the patent, though they have since been superseded by more modern improvements:. hence the expenses were rendered very great, though the object when obtained was not great; viz. the trial of infringement respecting the gas-meter only. If the inquiry had been limited to that object, as it ought to have been, the expense would not have been so great. It should be remarked, that there was no needless multiplication of descriptions in that specification. I have before stated to the Committee, that during the time allowed for making the specification, in 1816, two varieties of the gas-meters were in progress, and we had only time to put one of the two to the test of actual working, before specifying, and therefore we described both, not knowing which would prove best. The experiments that were made within a short time afterwards, showed us, that one of them would have been better omitted, but that we could not foresee at the time of specifying. In every other part of the apparatus only one variety of each improvement is

described; and my descriptions were all from real apparatus that I saw made or in action, except that one gas-meter, which could not be got to work in time. The gas-meters that have since been brought into use, and were the subject of the action, are not constructed like either of those described, but are simplified. One inquiry was, if they were essentially the same invention, though constructed in a different form; it was proved to the satisfaction of the court, by numerous witnesses, that they were; and also that the gas-meters described would operate; hence the jury gave a verdict; and on motion for a new trial, the court confirmed the patent.

Do you conceive that the expense of that trial would have been much less, if instead of going before a judge and jury, it had been tried by a commission composed of scientific persons?—The expense would have been much less; but I am not recommending such a tribunal. A new tribunal supposes a new law, and I think that the expense might be equally reduced, if a good law were established, and the questions tried as at present. The inquiries should be confined to the points of invention really in dispute; the sufficiency of the specification being insured by previous examination, and improved specifications admitted. Competent scientific witnesses should be appointed by the court, to examine the subject at the joint expense of both parties, and then be called by the court, instead of by the interested parties. Some limitation should be made as to the time to which evidence against the novelty of the invention may be carried back, and previous notice of all the circumstances of such evidence should be given to the opposite party.

Why do you not recommend a tribunal of scientific men?—Because I fear that they would be very much influenced by feelings that do not exist in the present courts; such men would want weight and firmness to control the counsel, who would perplex, and overwhelm them with rules of proceedings, forms, and precedents. Many men of competent knowledge of their subject, and of the greatest integrity, are not competent to act as arbitrators in disputes, from want of such firmness. Even experienced judges, though they will not yield to counsel, cannot avoid losing much time from their attempts to support a losing cause by subterfuges. Men unaccustomed to see through such attempts, and who were not determined to repress them, would be quite incompetent to preside in a tribunal; they might do very well in a jury, but that would not diminish expense. There are also other difficulties; men of science would want the necessary practical knowledge of the arts which come in question during such trials, and they are very subject to be misled by their previous theoretic notions; and if

practical artists and manufacturers were substituted, then established prejudices of trades, and jealousies of rival traders, would come into operation.

From my experience in the proceedings of courts, I have not been inclined, of late years, to complain of the administration of the patent law, by judges and juries, when it becomes known what that law is, and when sufficient evidence has been tendered. What I see reason to complain of is, the obscurity of the law; the difficulty of knowing what it is; the manifest injustice of many of its provisions when expounded by the judges, who often acknowledge its hardships; and the excessive expense of stating a case in the form prescribed, so as to enable the court to really decide according to the law. My own opinion of the proceedings of courts during the last ten years is, that where a sufficient expense has been incurred in instructing counsel, and in bringing intelligent witnesses, and providing models so as to make the subject intelligible to the court they examine very patiently, and decide so as to leave no reason to complain of judges and juries, but continual reason to complain of the law, and particularly the want of statute law; for even if a bad law were enacted, and made clearly known, it would be an improvement, as suitors would know what to do, and when to keep out of courts.

It appears in the account that you have delivered in, that the expenses of one party to a trial amounted in one case, to 718*l.*; have you known cases which have cost considerably more?—Yes; to the amount of more than double and also to require a series of trials, or proceedings, so as to amount to thousands, before any decision was obtained. That account in Crossley's case is merely his expenses for one trial; he had previous proceedings in Chancery, and must have many more either to recover damages, or to repress infringements; that trial was only the question of right, a mere confirmation of his patent by the court of King's Bench.

Do you believe those cases had been managed with due consideration to economy?—Certainly not in all cases. I have sometimes had reason to suspect that expenses have been purposely augmented by one party, in order to deter and annoy the opposite party, for they must apportion their means of defence to those of the attack, or the means of attack to those of defence, and the taxed costs that are paid by the losing party, is always in some proportion to the real expenses incurred by the winner, whether properly incurred or not.

Does not the apprehension of such expense deter infringers from attempting to set aside patents, or defending themselves when actions are brought against them by patentees?—Certainly,

unless a combination can be made, to subscribe for the expenses, and then the managers of the suit have every motive to increase the expenses; and quite as often the expense deters, or absolutely prohibits patentees from proceeding, until they make up a combination, and a monopoly under their patents, to provide a subscription fund; they are often driven to that course exceedingly against their wills, as well as against their interest.

Are patentees aware of that?—Some are, some are not, most attornies understand it very well; but, in general, where a combination and subscription fund exists, whether to support or to overturn a patent, the other side is usually an individual, and he has scarcely any chance. I never knew a case of combination and subscription on both sides.

Do you conceive patentees are sometimes induced not to defend patents, from the expenses which may be incurred?—That is very often the case, combined with the uncertainty of the result. It is more common for patentees to endure denial of justice by the expenses, than for infringers, because the balance of that uncertainty is very greatly in favour of the latter, and their facilities of combination greater. I have known an infringer begin to defend an action brought against him by a patentee, and then set about forming a subscription to pay his expenses, but as it did not amount to money enough, he gave up, without having incurred any expense, and took a license under the patent just before the trial, for which the patentee had made expensive preparations.

So that the expense which is incurred by an action on a patent operates sometimes against the public, and sometimes against the patentee?—Decidedly so, but always in favour of combinations, whether of monopolists, or of piratical infringers.

Do you conceive that the case you have mentioned, in which an expense of 700*l.* was incurred, was conducted with a due regard to economy?—I know that it was managed at as little cost as could be done; the attorney inquired very particularly about my charge in that business, and I believe about others, though the patentee himself did not; the expenses were higher than ordinary, from the circumstances I before stated, of the number of points that were unnecessarily involved in the discussion, although only one was really in dispute.

Do you conceive that if a servant of an inventor, who is employed to make experiments for him, discloses his invention to the public, such disclosure will prevent the inventor obtaining a patent?—If it is publicly disclosed, it certainly would either induce the Attorney General to refuse the patent being granted, or it would be ground for setting the patent

aside afterwards. What constitutes a public disclosure has never been accurately defined; any sale from one person to another is an established criterion: and less than that will do, but how much less is undecided.

Would it be any defence to shew the court that the invention had been disclosed by the inventor to his servant, with the view of making experiments?—Certainly not; that is to say, the disclosure to the servant would be allowed, but a real publication by that servant would be held fatal. I suppose that such a servant would be liable to make compensation for the breach of trust, but yet he has a complete means of avoiding that remedy, for if he is bribed, or wishes to spite his master, he may get the publication made at second hand; for if he communicates the invention to a second person, and that second person goes and publishes it; there is no remedy against that second person; and the communication from the servant, which constituted the actionable breach of trust, was made in secret, and cannot be proved.

I knew a case of what might be termed a secret publication; a manufacturer had an invention which he intended to keep secret, and not to take a patent for it; but a rival in the same pursuit having succeeded in attaining the result, applied for a patent; a law suit and quarrel existed between the parties at the time, for they had recently separated from partnership and had not settled accounts. To prevent the effect that this patent might have against the first named, he resolved to publish his invention, but he did that privately; for he sent a machine up to London, and set it to work before a number of people, who were told they might practise the invention, but it was so complicated that none were competent to understand or practise it, except a few who were servants, and agents of the publisher. If he had afterwards desired, from opposition or interest, to overturn his rival's patent, these competent persons would have been produced, to prove a real publication, but that was never attempted; and both parties went on working, until some years afterwards, when they made up the quarrel, and combined to prosecute others as infringers of the patent; it was then intended to prove in court, that the publication was a nullity, by calling only such witnesses as did not understand the invention when it was exhibited. The scheme failed and was abandoned before any trial, because the infringers had not followed the specification, but an improved machine, so different from it, that the patent could not be brought to bear against it, by any stretch.

About twenty years ago, some of the mechanists in Messrs. Marshall's flax mills at Leeds, invented the machine now gene-

rally used for heckling flax, preparatory to spinning; one of them applied for a patent for it, but was opposed by a Mr. Murray, who had been occupied with the same object. The Attorney General, being unable to find out the similarity that really existed, allowed the patent to pass; whereupon, before the date of the patent, Mr. Murray presented to the Society of Arts, the same model that he had exhibited in opposition.

So that in point of fact an inventor having occasion to employ persons to make experiments, has nothing to trust to but the good faith of those persons?—Certainly not; hence inventors almost always keep the secret to themselves, and continue in the dark, until they have got their patents. That this is the great reason why we see such a number of patents for absurd projects; the projectors usually find out their mistake within a short time after they disclose the secret, and hear what remarks are made upon it, often before they have made an actual trial, and many would then drop their patent, if they had not incurred almost all the expense of it, before they found out their delusion; I have continually advised patentees, who have brought old or absurd inventions to me, in order to make specifications to patents previously obtained, that it was not worth the trouble and expense of merely specifying, and they had better desist; but they have rarely done so, because of the expense they have incurred; and when I have urged the utter worthlessness of their patent if they did complete the specification, they have sometimes acknowledged it; but said perhaps they might nevertheless sell the patent to some one who did not know that fact.

In one of these cases an office copy of the specification I had made was afterwards sent to me by an attorney, to get my opinion on the goodness of the patent, and the value of the invention, for a client of his who was in treaty for the purchase; I knew the patent was good for nothing; but as I came by that knowledge in the course of confidential communication with the patentee, at the time of making his specification, I had no right, as a professional agent, to make use of that knowledge against his interests. On the other hand, as I might probably, by making search for the new party who asked my advice, have found out the same defect, even if the patentee had not previously communicated it, it was not right to conceal it. Under this embarrassment I took a middle course, and returned the papers, saying, that as I had prepared the specification, I must decline giving an opinion on what I had done myself; but as it was known that I make no such rule in other cases, the attorney at once suspected the fact.

One great object of the arrangements I have proposed in applying for patents, is to give the inventor every chance, if he is

under a delusion, of finding out his error, and abandoning his demand, before he has incurred a great part of the expense for a patent. I am confident that one half the patents now passed would be so withdrawn under the regulations I have proposed, although probably a double number of applications and deposits would be made.

Might not a part of the expense of trials on patent rights be saved, by calling on the parties to give notice to their opponents of the points on which they intend to rely in the course of the trial?—That would be of great importance, but would be rather difficult to enforce; because, although a patentee comes into court as plaintiff, on the infringement of his patent right, yet when defence is set up that his patent is bad he becomes in effect defendant thereof; hence it would be difficult to decide which party should give such notice. Patentees have constantly to prepare expensive evidence, and models, for points which are not ultimately called for by the court, and yet it cannot be foreseen what will be called for, and therefore every thing must be provided for the trial. I have not been called as a witness in a majority of cases in which I have prepared myself, and attended in court, after having put the parties to a considerable expense for models, and apparatus and assistants to make experiments, as well as for my own trouble; and other professional men whose attention had been directed to the same points with myself, have also been waiting in court at the same time, but have not been called. That was the case in Crossley's action, to which I have referred; there were several witnesses who had prepared themselves on particular points, but who were not called; and further, I and others who were examined, had been obliged to prepare to answer many questions that were not asked, and some felt deficient in knowledge of particular points on which they were examined, all for want of previous knowledge of what inquiry would be made; the expense would not have been so great, if effectual previous notice had been given of what points would be inquired into.

If an invention is discovered in a foreign country, a man may bring it over to this country and obtain a patent for it?—Yes, he may have a patent for "an invention communicated to him from a person residing abroad," provided such invention is not known or in use here.

Is that advantageous or otherwise?—Decidedly advantageous to us.

Why are you of that opinion?—From the fact that we have derived almost as many good inventions from foreigners, as have originated among ourselves. The prevailing talent of the English and Scotch people is to apply new ideas to use, and to bring

such applications to perfection, but they do not imagine so much as foreigners; clocks and watches, the coining press, the wind-mill for draining land, the diving bell, the cylinder paper machine, the stocking frame, figure weaving loom, silk throwsting mill, canal-lock and turning bridge, the machine for dredging and deepening rivers, the manufacture of alum, glass, the art of dyeing, printing, and the earliest notions of the steam engine, were all of foreign origin; the modern paper-making machine, block machinery, printing machine, and steam boats, the same; there are a multitude of others, that never have risen to any importance in the foreign countries where they were first imagined, because the means of executing and applying inventions abroad are so very inferior to ours. In almost all the above instances, we have so much improved and perfected what was brought into this country from abroad, that although they soon became important means of national wealth to us, the foreigners made little or nothing of them by themselves. Even after they got them back again in the improved state to which we had brought them, although they received their crude ideas matured, like children sent home, after having been well educated, and become full grown, by boarding for years, without expense, at a better school than home,—still they have not been able to set them to work so extensively and profitably as we have done. I am of opinion, that the appropriation to individuals for a time by patent, is essential to induce the necessary cultivation and training of foreign inventions to improvement; to effect their naturalization, or, as it were, to teach them the language of our nation; and also to insure the application of the crude ideas we may import from foreigners, to real use in business.

Do you not think that inventions for which patents have been taken out in a foreign country, would be almost sure to come into this country soon, without a patent?—Certainly; all knowledge will find its way into every country in time, but it is good policy to endeavour to accelerate the influx of foreign knowledge; I think that on the average of the operation of patent rights, they very greatly facilitate the establishment of new inventions to become branches of trade, as I have before explained, and I see no difference in any of those reasons, whether a new invention originates amongst us, or amongst foreigners. Even supposing there is no patent abroad, I conceive it puts our manufacturers under no disadvantage to be paying such a small tax as is usually levied by a patentee for licences, when foreign manufacturers may not be paying such a tax; because I feel confident of the fact, that under the stimulus and protection of a patent in Britain, the patentee, either by himself, or by men of talent who he can then afford to employ, will improve the

manufacture that is to be effected by the new invention, much more rapidly than can be done by the foreigners who are at work in the same course of improvement, without that stimulus, and with inferior means of execution; hence the tax the British patentee levies, will never be felt at all. If there is a patent abroad to stimulate corresponding exertions to improvement there, then the foreign manufacturers will be under a corresponding tax; but such taxes are in all cases a mere trifle, compared with the profits that manufacturers derive from the adoption of new inventions. It is obvious that we should not get even the bare idea of a new invention so soon, if we do not offer to grant a patent for it, as with that premium or bounty for its importation; also that in the latter case it will come to us in the most complete form that it has acquired abroad. When we do get an idea completely without a patent right, it is of no use for any one to incur the expense of cultivating it. The policy of granting the exclusive privilege for a foreign invention, stands on precisely the same ground as that for any other first idea. I can say, from long experience, that the new inventions we get fresh imported from abroad, are to the full as crude, and in as much need of future expensive cultivation, as any of the secret productions of our own inventors, when they first disclose them. I conceive, that in all cases, the operation of patent law is advantageous to the cultivation of first ideas, up to that point of practicability when they can be established as articles of trade and commerce; and also, after that perfection of invention is attained, the operations of trade, founded on new inventions, are very much facilitated by some person having an interest to devote all his energies to that trade, to create an extensive demand, and organize the means of supplying the same. The public usually come into practice in that new trade (under a trifling tax), as soon as ever they please, and if good laws were enforced, they would always acquire a complete right and possession at the expiration of the patent; not merely of the bare notion of how they might go to work to establish a new trade, but they would be put in full possession of an organized trade, which they would never have acquired in such perfection at all until a later period, if its cultivation towards perfection as an art, and establishment as a trade, had been left to the languid and desultory exertions of every one who might choose to do a little, *con amore*, without any exclusive benefit. Independently of mere pecuniary interest, men of genius are greatly stimulated to exertion, by the hope of having a right of property in, and control over, their own productions; for the same feeling exists that they have towards their children; and the absence of that confidence of property and right, induces

the same capricious, negligent, unconnected, and casual attempts at cultivation of new ideas or inventions, as is observable in men with the education and advancement of their children, whe the legitimacy is doubtful.

Supposing an article patented, and actually brought into efficient use abroad, is there any benefit to this country in allowing persons to introduce an article in that state, amd to have a patent for it?—Supposing the invention to be already as perfect as we could make it, there would be little advantage in allowing a patent for it, except that as it still requires to be made known, and brought into use amongst us, in spite of ignorance and prejudice, that bringing into use will be accelerated by the exertions of a patentee; nor do I see any equivalent disadvantage in granting a patent, because I know the taxes, levied by patentees, are always so slight.

Might not the public be benefited, by using it without a patent?—They would not get it into use so speedily without a patent, even if it were imported in a stage of high perfection as to invention, because there is a prejudice against the adoption of all new practices, that must be overcome; a patentee will labour to get over that for his own interest; but every successive importer who has adopted a new invention from abroad, without a patent, will of course keep it a secret as long as he can, and will disguise and deceive as much as possible, by saying, "that the invention which he got from abroad (and which others may get), proved good for nothing; he lost money by it, and it only served to set him to work on the subject, and he has made a new invention;" such false statements will pass current, and retard the adoption a long time. If we suppose the British patentee of a foreign invention, wished to keep it in his own hands, and would not grant licences, then that must be because he has means of supplying the public demand very freely, or else that exclusion would be destroying his own property.

It must not be overlooked, that the assumption of the invention being very perfect when it is first imported here, implies that it has been a long time in existence, and has been long cultivated in secret by foreigners, because they are so much slower at such work than we are: if we had offered the premium of a patent right for its early importation amongst us, there is every probability that we should have received it years before, in a crude state; either from the inventor himself, when it was in its earliest stage of infancy, if he kept it secret, or else from commercial speculators, if it were openly known. Having thus obtained the crude invention, we should have set our great means and powers to work on its perfection and cul-

tivation, at the same time as the foreigners began, and they would then have had no chance with us, to have attained the same perfection in the same time. I could cite many cases in support of these opinions.

List of Patents

GRANTED IN SCOTLAND SINCE SEPTEMBER, 1829.

(*Continued from* Vol. V. p. 114.)

For certain improvements on or additions to fire places. To Joseph Ange Fonzi, Esq. county of Middlesex.—Sept. 23.

For certain improvements in the construction of cannon. To John Tucker, county of Middlesex.—Sept. 23.

For certain improvements in apparatus to be applied to fowling pieces and other fire arms in place of locks. To David Laurence and John Crundwell, county of Kent.—Sept. 23.

For a new process or method of whitening sugars. To Joshua Bates, city of London.—Sept. 25.

For an improved method of constructing steam boilers or generators, whereby the bulk of the boiler or generator and the consumption of fuel are considerably reduced. To Joshua Bates, city of London.—Sept. 25.

For certain improvements in diminishing friction in wheeled carriages to be used on rail roads, and which improvements are applicable to other purposes. To Ross Winans, county of Sussex.—Oct. 28.

For a certain improvement or improvements in distillation To William Shand, Esq. county of Kincardine.—Oct. 28.

For certain improvements in the construction of anchors. To William Rodger, county of Middlesex.—Nov. 3.

For certain improvements in the process of manufacturing soap. To Charles Turner Sturtevant, county of Middlesex.—Nov. 6.

For certain improvements in machinery for spinning cotton and other fibrous substances. To Charles Brook, county of York.—Dec. 17.

For a new preparation or manufacture of a certain material produced from a vegetable substance, and the application thereof to the purposes of affording light, and for other uses. To James Soames, jun. county of Middlesex.—Dec. 17.

For an exploding shot or projectile. To John Tucker, county of Middlesex.—Jan. 25. 1830.

For a new alloy or compound metal applicable to the sheathing of ships and various other useful purposes. To John Revere, New York.—Feb. 2.

For a machine or hydraulic engine for applying the power or pressure of water, steam, or other elastic fluids to the purpose of working machinery and other uses requiring power, and applicable to that of raising or forcing fluids. To Edward Dakeyne and James Dakeyne, county of Derby.—Feb. 2.

For an improvement in ships' windlasses. To George Straker, county of Durham.—Feb. 8.

For an improvement in the manufacture of canvas and sail cloth for the making of sails. To James Ramsay and Andrew Ramsay, Greenock.—Feb. 9.

For an improved mechanical power applicable to machinery of different descriptions. To Thomas John Fuller, county of Middlesex.—Feb. 13.

For certain improvements on, or additions to, wheels or apparatus for propelling vessels and other purposes. To Anton Bernhard, county of Middlesex.—Feb. 16.

For an improved method of manufacturing salt. To John Braithwaite and John Ericsson, London.—Feb. 19.

For an improvement in the apparatus used for distilling. To Patrick Dawson, Lillyburne.—Feb. 26.

For certain improvements in apparatus used for distilling and rectifying. To Robert Busk, county of York.—Feb. 26.

For the manufacture or preparation of certain substances which he denominates the British tapioca, and the cakes and the flour to be made from the same. To John M'Innes, Esq. of Stirling.—March 3.

For certain improvements in the construction of window frames, sashes, or casements, sun-blinds, shutters, and doors designed to afford security against burglars, as well as to exclude the weather.—To Andrew Smith, county of Middlesex. —March 16.

For certain improvements in apparatus and machinery for cleansing and deepening rivers, and in the method of applying the same. To Thomas Affleck, Dumfries.—March 16.

For certain improvements in machinery for spinning cotton, silk, linen, and other fibrous substances. To James Carrick, Esq. county of Lancaster.— April 13.

For certain improvements in making or manufacturing bolts or chains. To Samuel Brown, Esq. London.—April 29.

For certain improvements in the means of keeping or preserving beer, ale, and other fermenting liquors. To William Aitken, Esq. Scotland.—April 29.

For certain improvements in apparatus for making and supplying coal gas for useful purposes. To Richard Witty, county of Stafford.—May 3.

For certain improvements on steam boilers and in carriages or apparatus connected therewith. To James Viney, Piccadilly.—May 12.

For a new method of purifying and whitening sugar or other saccharine matter. To Edward Turner, county of Middlesex.—June 14.

For an improved engine for communicating power for mechanical purposes. To John Ericsson, London.—July 21.

For certain improvements in preparing or finishing piece goods made from wool, silk, or other fibrous substances. To John Frederick Smith, Esq. county of Derby.—July 29.

For certain improvements on steam carriages and in boilers, and a method of producing increased draft. To John Rawe Junior, county of Middlesex—July 29.

For an improvement or improvements in the method or apparatus for separating the knots from paper, stuff, or pulp, used in the manufacture of paper. To Richard Ibotson, county of Middlesex—August 3.

For certain improvements on, and additions to, machines or machinery to be used and applied for conducting to and winding upon spools, bobbins, or barrels, rovings of cotton, flax, wool, or other fibrous substances of the like nature. To Joseph Cheeseborough, county of Lancaster.—August 19.

For a method or process of giving a metallic surface to cotton, silk, linen, and other fabrics. To John Yates, county of Chester.—August 19.

For a new method of making iron wheel barrows of wrought iron, with a wrought iron wheel, by which new method, said iron wheel barrows can be made lighter, stronger, more durable, and cheaper than any iron wheel barrows which have been heretofore in use. To William Mallet, Dublin.—August 19.

For an improved machinery for the navigation of vessels and propelling of carriages. To John Ruthven, Edinburgh.—September 6.

New Patents Sealed.

To Charles Derosne, of Leicester Square, in the county of Middlesex, gentleman, in consequence of a communication made to him, by a certain foreigner, residing abroad, and invention by himself, for an invention of certain improvements in extracting sugar or syrups from cane juice and other substances, containing sugar, and in refining sugar and syrups.—Sealed 29th Sep. 2 months, for Inrolment

To Michael Donovan, of the city of Dublin, for his invention of an improved method of lighting places with gas.—6th Oct. 6 months.

To Lieutenant Colonel Leslie Walker, C. B. of Cumming Street, Pentonville, for his invention of a machine or apparatus, to effect the escape and preservation of persons and property in case of fire, or other circumstances. —6th Oct. 6 months.

To Richard Pering, of Exmouth, in the county of Devon, Esq. for his having invented an improvement or improvements on anchors.—6th Oct. 6 months.

To John Heaton, William Heaton, George Heaton, and Reuben Heaton, of Birmingham, in the county of Warwick, manufacturers and copartners, for their having invented or found out certain machinery, and the application thereof to steam engines, for the purpose of propelling and drawing carriages on turnpike roads, and other roads, and railways.—6th Oct. 4 months.

To Joseph Harrison, of Wortley Hall, in the parish of Tankersley, in the county of York, gardener, and Richard Gill Curtis, of the same place, glazier, for their having invented certain improvements in glazing horticultural

and other buildings, and in sash bars and rafters.—6th Oct. 2 months.

To John Dickenson, of Nash Mills, in the parish of Abbotts, Langley, in the county of Hertford, Esq. for his having invented or found out an improved method of manufacturing paper by means of machinery.—6th Oct. 6 months.

To William Augustus Archbald, of Vere St. Cavendish Square, in the county of Middlesex, gentleman, for his invention of an improvement in the preparing or making of certain sugars.—13th Oct. 6 months.

To David Napier, of Warren Street, Fitzroy Square, in the county of Middlesex, engineer, for his having invented certain improvements in printing, and in pressing machinery, with a method of economising the power applicable to the same; which method of economising power is also applicable to other purposes.—13th Oct. 6 months.

To Francois Constant Jacquemart, of Leicester Square, in the county of Middlesex, Esq. in consequence of a communication made to him, by a certain foreigner residing abroad, for an invention of improvements in tanning certain descriptions of skins.—20th Oct. 6 months.

To Joseph Budworth Sharp, of Hampstead, in the county of Middlesex, Esq. and William Fawcett, of Liverpool, in the county palatine of Lancaster, civil engineers, for their having invented or found out an improved mode of introducing air into fluids, for the purpose of evaporation.—20th Oct. 6 months.

To Alexander Craig, of Ann Street, Saint Bernard's, in the parish of Saint Cuthbert's, and county of Mid-Lothian, in consequence of a communication made to him by a certain person residing abroad, for an invention of certain improvements in machines or machinery, for cutting

timber into veneers, or other useful forms.—20th Oct. 6 months.

To Andrew Ure, of Burton Crescent, in the county of Middlesex, doctor of medicine, for his having invented an apparatus for regulating temperature in vaporization, distillation, and other processes.—20th Oct. 6 months.

To Andrew Ure, of Burton Crescent, in the county of Middlesex, doctor of medicine, for his having invented an improvement or improvements in curing or cleansing raw or coarse sugar.—20th Oct. 6 months.

To Andrew Ure, of Southampton Row, in the county of Middlesex, doctor of medicine, for his having invented an air stove apparatus for the exhalation and condensation of vapours.—20th Oct. 6 months.

To Samuel Clerk, of South Down, Brixham, in the county of Devon, for his having invented certain improvements in making or preparing saddle lining, saddle cloth, and girths, for keeping saddles in place on horses, and other animals of burden.—20th Oct. 6 months.

To Sir Thomas Cochrane, Knight, (commonly called Lord Cochrane,) of Regent Street, in the county of Middlesex, for his having invented an apparatus to facilitate excavating, sinking, and mining.—20th Oct. 6 months.

To Timothy Mason, of Great Portland Street, in the county of Middlesex, brush maker, for his having invented or found out an improvement in the manufacture of painting brushes, and other brushes applicable to various purposes.—20th Oct. 6 months.

To Samuel Clegg, of Sidmouth Street, Gray's Inn Lane, in the county of Middlesex, civil engineer, for his having invented or found out an improved gas meter.—20th Oct. 6 months.

CELESTIAL PHENOMENA, FOR NOVEMBER, 1830.

D.	H.	M.	S.	
1	0	0	0	☉ before the Clock 16 *m.* 15 Sec.
1	3	0	0	☾ in conj. with f in Taurus
1	22	0	0	☾ in conj. with γ in Taurus
1	23	0	0	☾ in conj. with 1 δ in Taurus
1	23	0	0	☾ in conj with 2 δ in Taurus
2	4	0	0	☾ in conj. with α in Taurus
5	0	0	0	☉ before the Clock 16 *m.* 15 Sec.
6	22	53	0	☾ in ▭ last quarter
7	10	0	0	♀ in conj. with λ in Virgo
8	12	0	0	☾ in conj. with ε in Leo
9	2	0	0	☿ in conj. with ϰ in Virgo
9	13	0	0	☾ in conj. with σ in Leo
10	0	0	0	☉ before the Clock 15 *m.* 56 Sec.
10	4	0	0	☿ in conj. with λ in Virgo
10	4	0	0	☾ in conj. with β in Virgo
10	20	0	0	☾ in conj. with η in Virgo
11	7	0	0	☾ in conj. with 1 γ in Virgo
13	22	0	0	♀ in conj. with 2 α in Libra
15	1	55	0	Eclip. conj. or ● new moon
15	7	0	0	♀ in conj. with 2 α in Libra
16	0	0	0	☉ before the Clock 15 *m.* 4 Sec.
16	5	0	0	☽ in conj. with φ in Oph
19	12	0	0	☽ in conj. with d in Sagitt
20	0	0	0	☉ before the Clock 14 *m.* 13 Sec.
21	14	0	0	☿ in conj. with ♀ Long. 20° in Libra
21	14	0	0	☿ lat. 25° N. ♀ lat. 48° N. diff. of lat. 23'.
22	6	37	0	☉ enters Sagitt
22	23	44	0	☽ in □ first quarter
23	9	0	0	♀ in conj. with ϰ in Libra
23	15	0	0	☽ in conj. with λ in Aquarius
23	21	0	0	♀ in conj. with ϰ in Libra
24	1	0	0	☽ in conj. with φ in Aquarius
25	0	0	0	☉ before the Clock 12 *m.* 51 Sec.
25	0	0	0	☽ in conj. with ♂ long. 28° in Aquarius ☽ lat. 1° 55' S. ♂ lat. 46 S. diff. of lat. 1° 9'
25	2	0	0	♀ in conj. with λ in Libra
26	2	0	0	☿ in conj. with λ in Libra
26	18	0	0	☽ in conj. with ν in Pisces
27	0	0	0	♀ in conj. with 1 and 2 β in in Scorpio
27	20	0	0	☽ in conj. with μ in Ceti
28	10	0	0	♀ in conj. with 1 and 2 β in Scorpio
28	14	0	0	☽ in conj. with f in Taurus
29	9	0	0	☽ in conj. with γ in Taurus
29	10	0	0	☽ in conj. with 1 δ in Taurus
29	11	0	0	☽ in conj. with 2 δ in Taurus
29	15	0	0	☽ in conj with α in Taurus
29	15	0	0	Ecliptic opposition or ○ full moon.
29	16	0	0	♀ in conj. with ν in Scorpio

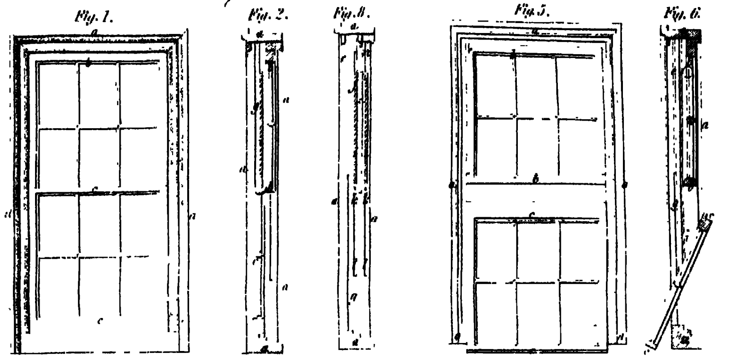
The waxing moon ☽.—the waning moon ☾

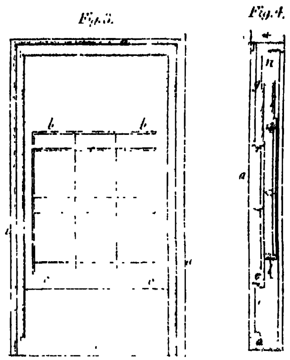
METEOROLOGICAL JOURNAL, FOR SEPT. AND OCTOBER, 1830.

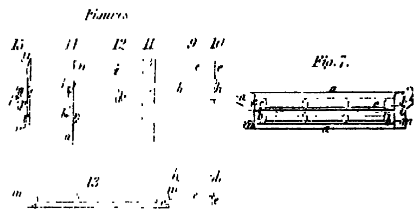
1830.	Therom.		Barometer.		Rain in inches.	1830.	Thermo.		Barometer.		Rain in inches.
	Hig.	Low	High.	Low.			Hig.	Low	Hig.	Low.	
SEPT.											
26	61	38	30,26	30,09	0,75	11	58	39	30,33	30,30	
27	61	35	30,28	stat.		12	58	46	30,26	stat.	
28	64	48	30,16	30,08		13	58	41	30,30	30,26	
29	56	46	29,96	stat.	,2	14	57	39	30,26	30,20	
30	57	37	29,99	29,98		15	55	29	30,16	30,14	
OCT.											
1	60	33	30,02	stat.		16	58	27	30,19	30,16	
2	61	46	30,02	stat.		17	57	27	30,30	30,25	
3	61	55	29,96	29,93	,075	18	54	34	30,23	30,16	
4	63	40	30,23	30,03		19	61	49	29,96	29,95	
5	59	42	30,30	stat.		20	69	46	30,05	29,95	
6	57	39	30,30	30,26		21	67	46	30,16	30,03	
7	62	43	30,32	30,26		22	67	46	30,19	stat.	
8	65	41	30,40	30,36		23	58	51	30,39	30,26	,025
9	60	48	30,44	30,42		24	57	44	30,39	30,29	
10	63	43	30,44	30,40		25	60	42	30,05	29,86	

Charles Henry Adams

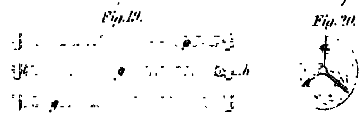
Profser's Impd Window Sashes

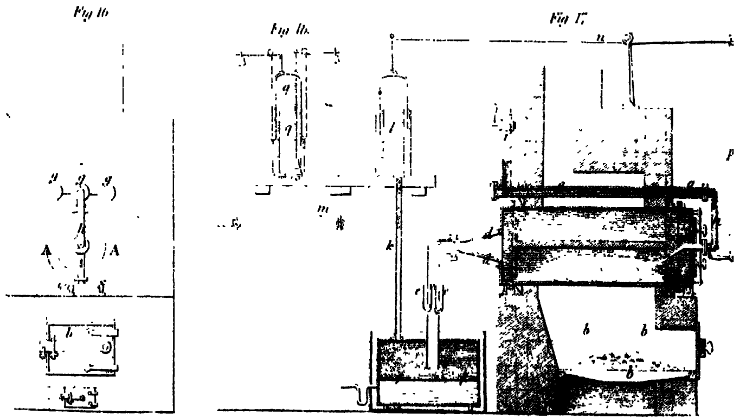




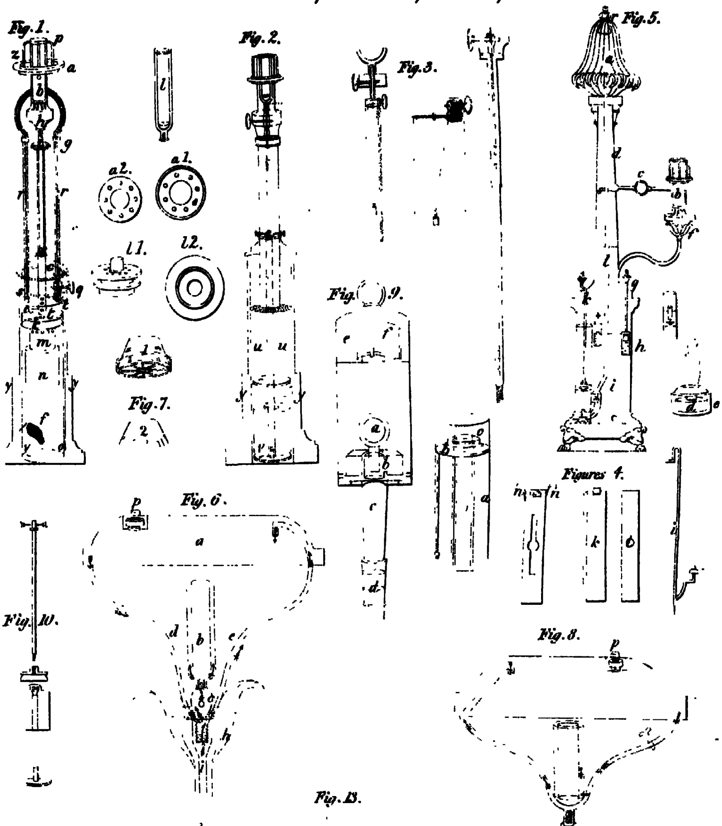


Robison Impt in the generation of gas

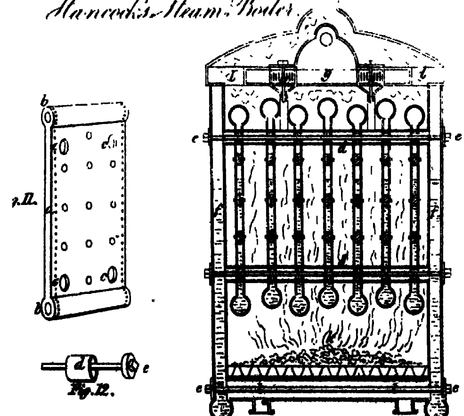




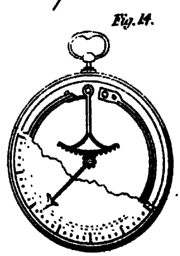
Robert's & Upton's Imp^d Lamp



Hancock's Steam Boiler



Imp^d Thermometer



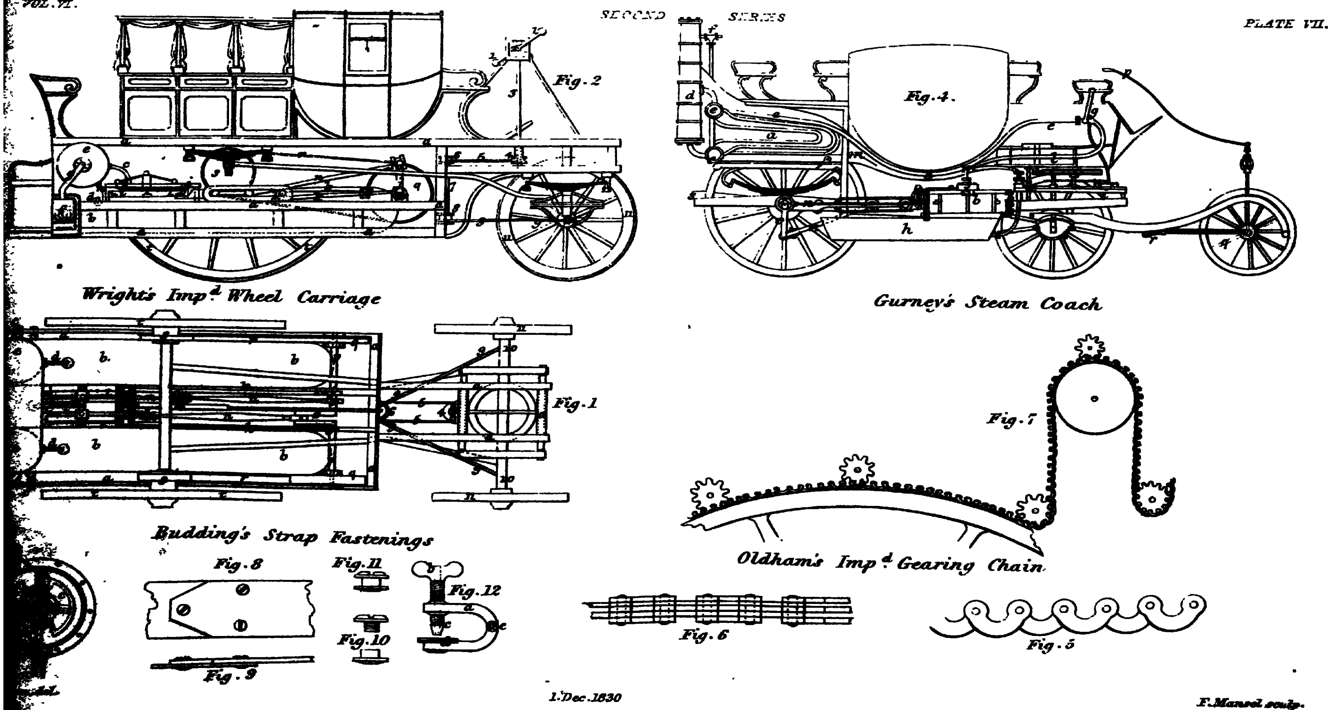


Fig. 2
Fig. 4.
Wright's Imp.d Wheel Carriage
Gurney's Steam Coach
Fig. 1
Fig. 7
Budding's Strap Fastenings
Oldham's Imp.d Gearing Chain
Fig. 8
Fig. 11
Fig. 12
Fig. 10
Fig. 9
Fig. 6
Fig. 5
1.st Dec. 1830
F. Mansel sculp.

THE

London

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No. XXXIII.

[SECOND SERIES.]

Original Communications.

Art. III.—To T. B. Lennard, Esq. M. P. Chairman of the late Committee upon Patent-laws.

Sir,—The re-assembling of Parliament naturally excites the attention of the various classes of the community to the anticipated measures directly bearing upon their several interests. Of those interests you had more immediately chosen as the subjects of your attention in the last Parliament, the urgent claims of the great body of scientific and mechanical men throughout the united empire engaged in the prosecution of inventions and new discoveries, and the means of affording them relief from the vexations and oppressions of the present system of patents under the seals.

You stood forward with every appearance of zeal and determination, the avowed champion of a large and most valuable portion of society—than whom none more justly demanded and more directly claimed the interference

of the legislature on their behalf. Interspersed throughout the innumerable ramifications of the arts and manufactures of the country—thousands hailed the approaching dawn of an improved system, that should give renewed energy to their intellectual pursuits, and that should cover the operative results of their mental creations with the broad ægis of *real protection*—of direct efficient security—of safe and available means of protecting and opening to the public service the entombed and immeasurable resources of the inventive talents of the community. How these just claims—these cheering anticipations—have been realized, the sequel of this address will shew.

In the session of 1828-29, you obtained in the Commons the appointment of a Select Committee, "to enquire into the present state of the law and practice relative to the granting of patents for inventions, *and to report their observations thereon to the House*." It is essential to bear in mind the obligation imposed upon the Committee, by their appointment—*to report their observations* upon the state of the law and practice to the House. Without such a Report, which necessarily would include *their views* as to the nature and extent of the remedies to be applied, the enquiry itself would not effect any beneficial result—it could only elicit the conflicting views of parties examined and an heterogeneous mass of evidence—upon which the House itself could not arrive at any conclusion so as to adopt the remedial measures, the necessity of which is implied by the actual appointment of a Committee of enquiry.

The Committee met and prosecuted the delegated enquiry with unremitting attention, and with the application of a rare union of talent, and the most patient investigation. The result of their preliminary labours reflected the highest credit upon their united exertions, and pro-

portionately raised the most intense anticipations of the benefits that would eventually result to the public, from the continuance and final completion of their laborious and most interesting duties. They presented at the close of the session a voluminous mass of evidence and documents to the House, accompanied with a short interlocutory Report, in which they allude to "the intricate and important nature of the subject" referred to them, and state that " at the present late period of the session they are *only* prepared to report the minutes of the evidence taken before them, together with the several documents; *and they earnestly recommend to the House, that the enquiry may be resumed* EARLY *in the next session.*" A more sensible and explicit statement of the views of the Committee, *as to the necessity* of continuing this important enquiry, and a more distinct pledge of their willingness to resume their meritorious labors, could not have been framed by any combination of language.

As a darkened contrast to this most excellent and welcome announcement, we find that the next session has been allowed to pass without a resumption of the enquiry according to the *earnest* recommendation of the Committee—and that no measures whatever were taken during the entire session in accordance with the directions of the House—that the Committee should report *their observations* upon the present state of the law and practice relative to patents for inventions. The efficient and practical object of their appointment has been delayed, (if it be not finally defeated) by the non re-appointment of the Committee; a discordant chaotic mass of elements—of conflicting judicial decisions—of jarring opinions—of opposing interests—of undigested schemes—and beyond all other " intricacies"—the treacherous dealings with mens' rights in the highest quarters by those who " have the

ear of a person about his Majesty ;"*—" the one hundred guineas given for signing one paper before another,"—each of and all these important matters required the re-appointment of the Committee as an imperative obligation, equally as it respected their individual character, and the rights of abused and oppressed inventors.

Without a resumption of the enquiry, the publication of the evidence and documents has only tended to increase the widely extended dissatisfaction which prevailed before men knew the amount of the frauds, and impositions, and wrongs to which they were subjected by this most iniquitous system.

Allow me, Sir, to ask with the respect due to a public character, but with the feelings of a man deeply interested in the redress of this wretched system of immeasurable ill—Why you, as Chairman of the Committee, should have suffered the whole of last session to pass away without moving for its re-appointment, according to its *earnest recommendation?* *You* are particularly called upon to satisfy the public as to this loss of an entire session, because, if I am rightly informed, it is the official duty of a Chairman, to move for the re-appointment of his Committee, when such re-appointment is reported to be expedient; no other member could, according to the established etiquette, take the business out of your hands. You were therefore bound, both in regard to the character of the Committee, *especially after the evidence they have published*,—and what is of greater importance—the claim of the public, to have the directions of the House complied with—to have moved the re-appointment of the Committee. The reasons why you have not so done, ought to be stated in Parliament. The proceedings of the Com-

* Vid. Mr. Rotch's Evidence.

mittee are stultified—the motive and object of their appointment are rendered abortive, and the galling injuries of the present system have been unnecessarily continued for another year—by the non-reappointment of the Committee, and by their not having complied with the essential practical intention of their appointment—" the Report of *their observations* on the law and practice to the House."

Allowing your utmost claim for ability and good intention, it is impossible, amidst the collision of views and the discrepancies which the reported evidence and documents present, that any individual, however gifted, can arrange and present to Parliament that complete system of amelioration, which " the intricate and important nature of the subject" demands.

The united abilities and matured judgment of a Committee are absolutely required for the production of that well organized plan of amelioration, which shall relieve the inventive talents of men from the anomalies, uncertainties, insecurity, *expense and insidious dealings,* to which they are still subjected, by the continuation of patents under the seals. Nothing short of an entire new and broad system *of real protection* will satisfy the claims of inventors, and open to the country the infinite resources in aid of its commerce and manufactures which are now bound under the accumulated weight of great and little seals, jobbing sign-manuals, and Chancery formula.

The task is too gigantic for any single hand; your direct and parliamentary course is still to move for the immediate re-appointment of the Committee, in order " to report *their observations* on the evidence," and to present *their* plans of amelioration to the House. This course will alone fulfil the object and end of their original appointment.

I am, Sir, yours, &c. &c.

Nov. 1830. VINDICATOR.

Recent Patents.

To THOMAS PROSSER, *of the city of Worcester, Architect, for his invention of certain improvements in the construction of window sashes, and in the mode of hanging the same.*—[Sealed 6th of March, 1830.]

THESE improvements are designed to enable sash windows to be readily turned inside out for the greater facility of cleaning the glass, without the danger attendant upon getting on the outside of the window for that purpose; and also to exclude the wind and rain in a more perfect manner than can be effected by the ordinary constuction of window frames and sashes. The following is the Patentee's description of this invention:—

SPECIFICATION.

"My invention of certain improvements in the construction of window sashes, and in the mode of hanging the same, are applicable to that description of window sashes which are hung or suspended from cords, and slide up and down in their frames, and are intended to render the sash windows more securely weather tight, so as to keep out wind and rain; by these improvements I am enabled to make sash windows of a more simple construction than those in common use.

"These improvements also consist in a peculiar mode of hanging or suspending the sashes, which will allow of their being turned inside out, for the purpose of more readily getting at the outside, (or that part which is exposed to the weather) of both the upper and lower sash, and by which either or both of the sashes may easily be removed from, or out of the window frame.

"That part of my invention by which I am enabled to form a better weather tight joint than heretofore, used in sashes of the common construction, consist of projecting ribs or tongues on the sides of the frames of the window, which ribs or tongues fit into grooves in each side of the sashes, and thus exclude the weather in a more perfect manner, and at the same time serve as guides for keeping the sashes in their places, as they slide up and down in the window frame. The ribs or tongues extend the whole length of each sash, but those belonging to the lower or inside sash are made to slide in grooves extending from the top to the bottom of the window frame, for the purpose of allowing them to be raised up to the top part of the window frame, and out of the groove in the sash, so as to allow of the sash being turned inside out, for the facility of more readily getting at the outer side; and this movement of the rib or tongue belonging to the sash, will allow of the same operation being performed on the upper sash when it is pushed down to the bottom of the window frame. The lower sash being previously raised with its projecting rib to the top of the window, there will be nothing projecting beyond the flat side of the window frame to obstruct the upper sash from being turned inside out.

"Another part of my improvement is in the manner of hanging the sashes, and consists of a peculiar mode of attaching, or connecting the sashes to the sash lines, or suspending cords, which mode of connection will allow of the sashes turning in the joint, or point of suspension freely, but without disuniting the sash from the suspending cord; and also allows of either or both the sashes being disunited from the sash lines, and removed out of the window frame.

"My improvements also consist in the hanging or sus-

pending both sashes from one sash line or cord, so that the weight of one sash will balance the other, by which I am enabled to dispense with the double cord pullies, and the sash weights used in the windows of the common construction. All of which improvements will be better understood by the drawings hereunto annexed, and the following description thereof; the same letters of reference referring to similar parts in all the figures.

"Plate V, fig. 1, is a front view of a window frame and sashes complete, as they appear when closed. Fig 2, is a section taken vertically through the same. Fig. 3, is a front view of a window, with the sashes partly opened. Fig. 4, is a section of the same. Fig. 5, is another front view of a window with the sash turned inside out. Fig 6, is a section of the same. Fig. 7, is a section, taken horizontally through the window frame; and fig. 8, is another section, taken vertically through the same; but, with the sashes removed for the purpose of shewing the grooves, and projecting ribs or tongues; *a, a, a, a,* is the frame work of the window; *b,* is the upper sash, and *c,* the lower. These sashes are suspended from the lines, or cords, by a peculiarly formed joint at *d, d,* described hereafter; *e, e,* are the projecting ribs or tongues on the sides of the window frames, which are inserted into the grooves *f, f,* in the lower sash *c,* by which a weather tight joint is formed, when the window sash is shut down. These ribs also serve as guides to keep the sash in its place, as it slides in the frame of the window, and prevent the rattling or shaking of the sash.

"The rib of the lower sash *e, e,* is made to slide up and down in a groove *g, g,* in the side of the window frame *a, a,* and has small springs *h, h,* (see figs. 9 and 10,) which are detached views of the projecting rib or tongue, when taken out of the frame affixed at the back, for the purpose of keeping it in the groove *f.*

"When the bottom sash *c, c,* is to be turned inside out, the rib *e,* is to be raised up to the top of the window frame, sliding in the groove *g*, (see figs. 2 and 8), and the sash pushed down to the bottom of the window frame, when the rib being out of the way, the sash will be allowed to turn freely on the suspending joints *d, d.* When the upper sash is to be turned, the lower one is to be raised up to the top of the window, with its projecting rib, and the upper sash *b, b,* to be lowered to the bottom of the window frame, leaving its rib, which in this instance is fixed to the side of the window frame, and will now be free to turn on its pivots at *d, d.*

"In all the foregoing figures, the sashes are shewn, both connected to one suspending cord or sash line *h, h,* which is passed over a pulley *i,* turning on bearings in the side frame of the window, and as one sash is raised the other will be lowered, their movements being simultaneous.

"When the sashes are to be made so as to turn on the point of suspension, and also allow of their being taken out of the window frame, I use the following mode of connecting them to the sash lines or suspending cords: on the end of the sash line *h,* is firmly attached the piece of iron or other metal *k,* having a slot or eye in it (shewn more particularly in the detached figures 11, 12, 13,) which piece with the cords move up and down in the grooves *z, z,* in the side frame of the window; on the side of the sash frame is the projecting stud or pivot *m,* having its end formed into the shape of a T, and which stud is to be introduced into the slot in the piece *k,* and when put together, as shewn in fig. 7, the connection is complete, and the sash will be allowed to turn on the pivot in the slot of the suspending piece *k,* without danger of their being disunited, the groove *l, l,* keeping the union com-

plete; the cord and suspending piece being in the groove and out of the way of the sash as it is turned.

"When it is desired to take one or both of the sashes out of the window frame, the sash is to be turned into the horizontal position, and either side of it raised up, and the cord taken out of the groove *z*, when it can be disunited from the suspending piece *k*, and on the other end being taken out of the other groove, it can also be disunited from the sash, which is now free to be taken away. On putting a sash into the window frame again, one of the suspending pieces are to be connected to the pivot, and put into the groove, then the other cord is to be attached to the other stud, and put into its groove, and lowered to the horizontal position; it may then be turned into its proper position in the window frame.

"Should the suspending cords or sash lines, at any time become stretched and require shortening and adjusting, I use the following mode of effecting that object: a part of the side frame of the window in which the pulley *j*, is mounted, is made to take out, and with it the pulley and sash line, as shewn in the detached figs. 14, and 15; *i*, is the pulley before mentioned, which turns in its bearings in the piece *p*; on this piece *p*, is a dovetail piece, which fits into the groove in the piece of the side frame *n*; on the bottom of the piece *p*, is the adjusting screw *r*, the head of this screw rests on the solid part of the side frame *a*, when the sashes are in the window frame, and on turning this screw round, the pulley can be raised or lowered in its position as regards the sashes; the piece *p*, sliding in the groove in the piece *q*, and thereby keeping the joint always in the frame work closed.

"Having described particularly the construction of my improved sashes, and the manner of hanging or suspending the same, it only remains for me to remark that when

both sashes are hung or suspended from one cord only, and which are not intended to turn on their points of suspension, the peculiar mode of connecting them to the sash lines as described may be dispensed with, and the cords attached in the usual way; but when the sashes are to be constructed, so as to take out of the window frame, then I recommend that the last described method should be used.

"When it is desired to hang or suspend sashes independently of each other, and which are intended to turn on their points of suspension, the sash lines or cords may be passed over pullies in the side frames of the window, and balance weights connected to their ends, as in sashes of the common construction.

"I wish it to be understood, that I do not mean or intend to claim as a part of my invention, simply constructing sashes so as to turn on pivots or centres, as I am aware that they have been so made and constructed before. But I do claim as my invention, the peculiar method of hanging or suspending them to the sash lines or cords by the joints or connections herein described, so as to allow of their being disunited without taking out any part of the window frame, and which also allows of their turning freely on their centres. And also the manner of hanging or suspending both sashes from one sash line or cord, and in the manner of adjusting the same. And also in the application of the projecting ribs or tongues, for the purpose of forming a more weather tight joint than heretofore used, and in the making or constructing of the same, so as to slide out of the way when the sashes are to be turned inside out.—[*Inrolled in the Roll's Chapel Office, September,* 1830.]

Specification drawn by Mr. Berry.

To HENRY PINKUS, *of Thayer Street, Manchester Square, in the county of Middlesex, Gentleman, and* JAMES COLLIER, *of Newman Street, Oxford Street, in the same county, Civil Engineer, for their invention of an improved method, and apparatus for generating gas for illuminations.*—[Sealed 5th of April, 1830.]

SPECIFICATION.

" THE several parts of our ' improved method and apparatus for generating gas for illumination,' consist, First, in an improved compound material, the object of which is the more convenient use of certain resinous bitumen, such as common rosin, pitch, or Archangel or Stockholm tar, or a solution of any of these with coal tar; to these are added sugar, or molasses in quantity and manner hereinafter described; or other combustible matter having similar properties. These, in decomposing by a red heat with the bitumen, prevent the formation or developement of a certain acid, by the action of its oxygen; which acid would act on the metal of the retorts, and is exceedingly detrimental to them. Secondly, in effecting such neutralization by means of admitting into the retort when in action, an excess of ammoniacal or hydrogen gas. Thirdly, in passing the fluid material to be decomposed, first, through strong metal tubes called generators, in which it is kept under strong pressure, either by means of a force pump, or a high column of the fluid, which fluid becomes heated to a high degree of temperature, and is rendered thinner before it is admitted into the retort, into which it is injected in small streams or sprays, by the action of a force pump, or its expansibility by the absorbed heat. Fourthly, in combining with these improvements the principle of a revolving retort divided into compartments, for which a patent was granted to me the said Henry Pinkus, dated fifteenth

of Aug. one thousand eight hundred and twenty-seven.* Fifthly, in the adoption and combination of a feed valve, and compensation valve, or governor, as exhibited in the drawings at fig. 18. Sixthly, in completing the manufacture of the gas by further abstracting its impurities, and rendering it more fit for use by means of a dry chloride of lime purifier, placed at what is called the outlet valve, which purifies the gas after it has left the gasometer on its passage to the street, mains, or burners.

"The mode of preparing the compound material from which the gas is to be generated is as follows: we take of common rosin, or pitch, or any of the bitumen, dissolved by the ordinary means, one hundred weight or a similar quantity of Stockholm or Archangel tar, this being heated to a temperature of from 150° to 200° Faht. we then add to it from about five to seven per cent. by weight of sugar, or molasses, or other similar combustible, affording an excess of carbon, taking care to agitate the mixture continually, until all effervescence ceases. This compound is then in a fit state to be used for producing gas in the way herein described.

"Plate V, fig. 16, is a front or end view of a cylindrical retort A, divided longitudinally into three compartments, as seen at *a*, *a*, *a*, in the cross section fig. 19, and in in the longitudinal section fig. 17, which is placed in a common coke oven or furnace *b*, *b*, *b*; its periphery resting on friction rollers, placed at *c*, *c*. Fig. 17, is a longitudinal section of the whole apparatus; *d*, is an end piece, having an elbow and stuffing box, the elbow dipping into a hydraulic joint *e*, *e*, and communicating with the condensor *f*. In figs. 16, 17, and 18, *g*, *g*, *g*, are the generators communicating with the retort, by a pipe *h*, having a feed cock; *i*, is a pipe to supply the generators

* See Vol. I, page 273, Second Series.

by a column, or force pump; *k*, fig. 17, is a pipe leading from the condensor to the feed valve *l*, fig. 18; and *m*, is a pipe forming a communication between the feed valve and governor; *n*, is a lever, one end of which is attached to the feed valve, and the other to the supply cock *o*, fig. 17, by a rod *p*.

"The surfaces of the compartments on to which the heated material is to be injected, should be covered with fragments of bricks or coke. The retort being heated to a bright cherry red, the material may be passed into the generators by means of a force pump, or by a column of the fluid of convenient length, according to the required pressure necessary to keep the generators full. When the fluid has become sufficiently heated, vent must be given at the feed cock, when it will by its expansive force flash off into the retort in small streams or sprays, and will fall nearly equal over the red hot surface, and will consequently be more effectually and quickly decomposed than by the common mode of letting the fluid fall on one part of the retort, which would soon become cooled down to a black heat, and cease to decompose the material, whilst the remaining part of the retort would frequently acquire so intense a heat as to deposit much carbon. The material having absorbed caloric in its passage through the generators, will require proportionably less heat to decompose it in the retort.

"By the common method of using the resinous bitumen, much inconvenience has arisen owing to the detrimental effects produced on the metal of the retorts by the developement of its oxygen, and the consequent formation of acids in the retort. To obviate these injurious effects, sugar, or molasses, or other similar combustibles, affording an excess of carbon, is combined with the bitumen as before described. When this compound material is subjected to a red heat, and oxygen is developed,

part of the latter will unite with the excess of carbon to form carbonic acid gas (which may be removed by purification), and a part will unite with hydrogen to form water, which will be deposited in the condensor, and may be separated from the resinous matter by decantation.

"Another part of our method of neutralizing the aforesaid deleterious effects, consists in admitting into the retort when in action ammoniacal gas, or hydrogen gas in excess, part of the oxygen will unite with the hydrogen gas, or hydrogen of the ammonia, and water will be deposited as before, some nitrogen from the ammonia will appear, the metal of the retort will thus be preserved, and their power to decompose be less impaired.

"The advantages comtemplated in the adoption of the revolving retort for this purpose are, First, that in a given capacity for generating, there is considerably less metal to be heated; Secondly, much smaller ovens or furnaces will be required, and there will be consequently less radiating surface, a saving in fuel, and fewer condensing vessels required; but we do not confine ourselves to any particular form of retort.

"The effects produced in fixed retorts by oleagenous or carbonacious matter falling on and adhering to one surface, is of such a nature as to diminish the power to decompose and obstruct the absorption of heat; by turning the revolving retort on the friction rollers, fresh surfaces are presented to action, when the previous ones will have time in some measure to recover their former condition.

"The advantage contemplated by the combination of a feed valve with a compensating valve, or a common governor *q*, *q*. Fig. 18, is the regulating by the latter the supply of gas to the burners with more uniform pressure, and preventing the agitation or jumping of the lights, caused by the sudden or unequal velocity of the gas

issuing from the retort. As the gas issues from the retort it enters the feed valve, lifts one end of the lever, depresses the other, and shuts off the supply to the retort. As the gas becomes exhausted, the feed valve becomes depressed, and the other end of the lever at *p*, rises, opening the supply cock, when more heated material flashes into the retort.

"We claim as our improvement, First, the above described method of neutralizing the effects and inconveniences arising from the common manner of using the resinous bitumen, by adding to the bitumen molasses, sugar, or other similar material, which shall unite with the oxygen developed in the retort, and form compounds less detrimental; Second, the means of effecting the same object by admitting into the retort when in action, ammoniacal or hydrogen gases; Third, injecting into the retort any material to be decomposed, whether by the action of a force pump, or by the expansibility of heated material; Fourth, the method of heating in generators under pressure a material to be decomposed; Fifth, the combination of a compensating valve, or governor, in conjunction with a feed valve; but we disclaim them when uncombined or separate; and Sixth, the application of a finishing purifier when placed at the outlet valve, as before described; and we disclaim all other things which it has been necessary for us to mention in our above description, and which are not included in this claim made by us, as 'our improved method and apparatus for generating gas for illumination.'"—[*Inrolled in the Rolls Chapel Office, October,* 1830.

Specification drawn by Mr. Newton.

To HENRY ROPER, *of Baker Street in the parish of St. Mary-le-bone, in the county of Middlesex, Esq. a Rear Admiral in our Royal Navy, for his having invented a new and improved system of signals; First, for communicating by day, by the means of flags and pendants between ships at sea, or other objects far distant from each other; in which system the colours of the flags and pendants which have heretofore served to distinguish the signals one from another, and which by distance or other causes are extremely subject to be mistaken, may be dispensed with altogether; and, Secondly, for communicating by night, between ships at sea and other objects far distant from each other, by the means of lights; and which system of signals is more conspicuous, expeditious, and certain, than any which has hitherto been employed for the like purpose.*—[Sealed 21st of June, 1827.]

THE features of this invention are almost as fully described in the above title as in the specification itself. The object of the Patentee does not appear to be that of altering altogether the system by which signals or telegraphic communications are made from one ship to another at sea, but to simplify the process, by forming the subjects intended to be communicated into classes, and adapting to each class of subjects, peculiar signals at the onset, leading to the kind of correspondence intended to be carried on. By so doing the number of signals, consisting of flags and pennants are reduced from forty-eight, the ordinary compliment to only twenty-two, and of course are less expensive, more easily worked, and not so liable to mistake as when a greater number are employed.

These signals are intended to represent numerals, and by

being placed at different elevations, point out whether units, tens, hundreds, or thousands; and the number thus shown, refering to a signal book, indicates by the corresponding number in the book, the word or sentence designed to be expressed.

The device upon the flag or pennant is sometimes to be the signal, at other times the colour of the flag or pennant is to be the significant mark, and at night time lanterns, with coloured glass of divers shapes, are to be employed instead of flags.

In conjunction with these, balls and other marks are to be occasionally employed; but as the specification does not point out the modes of working them (which indeed depends upon the previous arrangement of the sentences' word, or syllable in the signa book), it would be useless for us to extend our description of the Patentee's views further.—[*Inrolled in the Inrolment Office, Aug.* 1827.]

To JOHN ROBERTS, *of St. Helen's, near Liverpool, in the county of Lancaster, at present residing in Wood Street, Cheapside, in the city of London, Engineer, and* GEORGE UPTON, *of Queen Street, Cheapside, in the same city, oil merchant, for their invention of certain improvements in Argand and other lamps.*—[Sealed the 24th of November, 1827.]

SPECIFICATION.

"OUR improvements consist, first, in regulating the admission of atmospheric air to the burners of oil, spirit, and gas lamps, where chimney or outside glasses are used, to obtain the best and most perfect combustion of the said oils, spirits, and gases: secondly, in regulating the supply of oil to the burner, and in carrying and keep-

ing it so fully up to the wick, that it may come in direct contact with the flame, and a part of it pass over unconsumed; and by which superabundant supply of oil, the wick or cotton may be kept moist, and prevented from crusting, as is usual, where the common or inferior oils are burned in the Argand lamps, as at present constructed.

"By this superabundant supply of oil, the combustion is greatly improved, but when combined with the improved means of properly regulating the admission of atmospheric air, a brilliant flame may be obtained from oils of an inferior quality (such as seed and common fish oils), in such lamps as where sperm oil has in general only been burned: thirdly, by preserving from waste, and conveying from the burner the oil that has passed the flame unconsumed, to a suitable receiver, and from thence passing it conveniently, and without emptying it out of the lamp, to its original situation in the lamp, in order that it may be returned to the flame for use; which is done, whether the reservoir be in the base of the pedestal, or above the burner: and fourthly, in raising a supply of oil to the burner, when the reservoir or cistern is below it, by a combined liquid and metallic pressure.

"These improvements are fully described and ascertained by the drawings hereunto annexed, and the following description thereof; Plate VI, fig. 1, shews the improved Argand burner *b*, the lamp being partly in section.

"The sides of the cistern are all of equal heights (see its section in the detached figure *l*;) the rim of the cotton regulator and glass holder, is raised about one-sixteenth of an inch above the cistern.

"The advantage of this alteration is, that the oil cannot, as in the common burners (where the outward rim is lower than the inner one,) escape without coming into direct

contact with the flame; and which not only assists in keeping the flow of oil up to the flame, but helps to turn that which is not consumed towards the inside of the burner-tube, on its way to the oil-cup.

" In other principles this burner is the same as those in general use, and is, like them, capable of being made in various ornamental forms; *a*, is the air regulator; it consists of two plates, one working under the other; each plate has holes or spaces of the same size; they are placed directly under the gallery or glass holder, but do not interfere with its free action. The upper one is fixed to the burner tube, the under one is moveable, and, by its action, opens or closes, in part or wholly, the holes or spaces in the upper plate, so that the quantity of air admitted to the outer circle of the Argand burner, can be regulated as required, for the proper combustion of the ignitable matters. The plates are shewn separately in the detached figures, the upper one *a* 1, the under one *a* 2; a gas regulator, on the same principle, is shewn in the detached fig. 7.

" The cover *c*, of the upper part of the cylinder and case of the oil lamp, fig. 1, lifts up when the oil is to be poured in, and is fastened down by two pins passing into grooves, or it may be left loose at pleasure. The oil may also be put in at the cup *h*, and pass down the pipe *i*, when the cover *c*, may be soldered to the top of the cylinder, so as to allow the quantity of oil, lying on the top of the disc of the piston, to be increased; *d*, is a fixed flooring, through the centre of which a piston rod *x*, is allowed to pass freely; it has openings, to let the oil proceed through to the disc or plate *l*, where it remains till let through the valve into the lower chamber *f*, which is effected by raising the piston rod; *e*, is the upper chamber or space between the flooring *d*, and the disc or plate *l*.

"The extent of this space is increased or diminished by the quantity of oil contained in the lower chamber *f*, as will be seen by comparing figs. 1 and 2; fig. 1, being supposed to be full of oil below the valve, and fig. 2, to be nearly empty; *f*, is the lower chamber of the cylinder, which lies under the piston disc valve, and receives all that passes from the upper chamber *e*, through the valve *o*. The oil here is in direct communication with the supply-pipe *g*, and is acted on by the oil lying above the disc, and the weight *n*, and is propelled upwards, through the supply-pipe *g*, to the burner-tube *b*.

"The supply-pipe *g*, which rises from the lower chamber *f*, and is connected by a screw or otherwise to the burner-tube *a*, may either be carried outside the cylinder as in fig. 1, or passed up the centre through the metallic weight *n*, in the centre leather packing, the disc *l*, the waste pipe *i*, and the piston-rod *x*, to the burner *b*, as in fig. 2; *h*, is the oil-cup, or receiver of the overflowing oil from the burner; it has a grating at its bottom, by which the oil passes to the pipe *i*, and thence to the disc, to be passed through the valve *o*, to the lower chamber *f*.

"This pipe may be distinct from the supply-pipe, as in fig. 1, or it may form a covering to it, as in fig. 2; in both these cases it has holes at the bottom to let the oil through; *k*, is the leather packing which surrounds the disc *l*; it is firmly held between the upper and lower plates of the disc, which are screwed together. The metallic disc or plate of the piston rod should nearly fit the cylinder; it is circular, and is composed of two parts, screwed together, (as in the detached figs. *l* 1, and *l* 2,) holding the leather packing between them: the outward edges are surrounded with leather or other flexible material, to make it oil-tight; it must also have leather or other proper packing, protected by a screw or other

means, to secure an opening in its centre, when the supply ppe, as in fig. 2, is carried through it.

" The disc may be connected with the piston rod by a small ball, inserted in a socket, so that it may move in any way ; it has holes or spaces on its surface, to let the oil pass through to the under plate, and a valve *o*, which opens downwards, and lets the contents of the upper chamber *e*, pass to the lower chamber *f*; *m*, is a rim of metal, which connects the rim of the lower piston disc with the weight *n*, shewn in fig. 1 ; it may be screwed, as in fig. 2, or otherwise fastened to each ; it surrounds the valve in fig. 1, and has holes round it to let the oil through ; *n*, is a metallic weight, connected with the disc *l*, and with the rim *m*, fig. 1, or by a screw as in fig. 2; *o*, the valve of the disc, opens a small way downwards when the piston rod *x*, is raised, and is closed by the under pressure when the piston rod is depressed ; it is composed of leather, or may be made of any flexible material proper for the purpose, shewn in the detached fig. 10 ; it is shut in fig. 1, and open in fig. 2.

" The outside or ornamental case of the lamp is shewn at *y*, *y*, figs. 1 and 2 ; *z*, is the gallery or glass holder ; *p*, a case to the burner tube, to prevent the oil which overflows being seen outside the burner; the cup in fig. 1, screws on it at the bottom, and in fig. 2, it rests inside the cup ; if thought unnecessary, it can be omitted ; *q*, is the cock to regulate the supply of oil to the burner ; it may be placed in any part of the oil pipe, where it may be found most convenient or ornamental : the opening in it may be either a hole through the stopper, or an aperture made at one side ; *r*, *r*, are pipes or pillars in fig. 1, to support the burner tube and for ornament ; *s*, *s*, screws in sockets or plates, to fasten the pillar *r*, on one side to the flooring *d*, and to connect that part of the supply pipe *g*, above the flooring to that which runs from the lower part

of the cylinder, and passes through its side directly over and on the flooring, as shewn in fig. 1.

" These pipes or pillars may also be fastened by a union joint; *t*, is a plate with a hole in it, soldered to the flooring *d*, and lying under the screw plate *s*, which connects the upper and lower parts of the supply pipe together; it has a leather packing to prevent leakage; *v*, is a circular hole and screw, to let out any impure matter that may be deposited in the lower chamber; which hole may be used or not at discretion.

" The pipe which conveys the waste oil from the cup has two studs or handles, in fig. 2, which serve to raise it; a ring may be put to facilitate the raising of it, or it may be raised by a windlass and chain, as in the detached fig. 3, or by pullies, or other mechanical powers well understood; *u*, is a perfect metallic cylinder, tinned inside, and forms the base of the lamp; it extends from the circular hole to the cover *c*, shewn in fig. 2, above the disc; it supports the oil that forms the liquid pressure below; it contains the weight or metallic pressure, and the oil to supply the burner.

" The liquid pressure, during the action of the metallic pressure, is increased by the oil which passes unconsumed from the burner. The vessel may be considerably decreased in its dimensions, but any reduction in its size must be governed by its having to contain, in addition to the necessary machinery before described, the oil to supply the flame for the length of time the lamp is required to burn.

" The detached fig. 10, represents a piston rod, through which the supply pipe passes, a screw shews where it is connected with the disc and weight, and how it and the disc are connected by a ball and socket; an aperture is made through the weight for the supply pipe to pass, which is surrounded by leather packing, to prevent the oil rising

through it from the under chamber, and the packing is held and secured under the screw that connects the disc and weight together. There is a socket fixed to the bottom of the cylinder, with holes, to which the supply-pipe is screwed, as shewn at *v*, fig. 2. This also shews the opening at the bottom.

"In fig. 2, is a section of the supply-pipe, shewing how it passes through the cup, and is attached to the burner by the screw; this section also shews, that it is covered by the pipe that carries off the waste or unconsumed oil that has passed from the burner, which pipe is also covered by the piston rod, which is raised to its greatest height when the lower chamber is full of oil; and it will be observed that these lamps are capable of all the variety of forms common to pillar lamps, where the oil to supply the burner is contained in a vessel of a cylindrical form, in or near the base of the pillar.

"To charge or fill the lamp the oil should be poured in above the flooring, either by lifting up the cap when that is loose, or pouring it in at the oil cup. When sufficient oil is poured in, the piston rod should be gently raised, by which means the lower chamber will be quite full; the piston rod should then be left to its own action, and when the lamp is to be lighted, the cock should be turned on; this last operation may be done a few minutes before the lamp is wanted. If too great a supply of oil should be passed to the flame, it may be restrained by the cock; a valve *h*, in fig. 5, may be attached, to give notice when it is full of oil, to prevent its running over.

"Fig. 4, represents several detached parts of a lamp made to receive a ribbon or flat wick, and has no inner current of air; the air is admitted through the regulators to the outside of the flame, and passes to it between two caps or inverted metal dishes, with apertures in their cen-

tres. The wick rises through the under one, and the flame only is allowed to pass through the upper one. The effect is, that the air allowed to pass through the regulators, comes in direct contact with the flame, as it must pass between the space left between the upper and under dishes, and can only escape with the flame through the aperture in the upper one.

" This burner and apparatus may be applied to all lamps with flat wick. The oil flows to it in the usual manner, and it may receive a chimney glass of the common kind ; *a*, the outward case ; *b*, the circular air regulators, as described above ; *c*, the rim, over which the under dish *d*, is placed ; *e*, is the upper dish, which conducts the air to the flame, and is placed over the smaller dish *d* ; *f*, is the cotton holder, which is a metal case, with an aperture, to allow the oil to flow to the wick, and another near the top, to allow the wick regulator *i*, to act on it ; it has also two wires *n*, to prevent its slipping down the case ; *k*, is the case through which the oil flows at *l*, to the inner case *f* ; it has also a square projection, to receive the prong of the cotton regulator *i*.

" In fig. 5—*a*, is a vase above the burner, containing oil to supply the flame ; *d*, is a space in the pillar, through which the oil passes to the burner from the vase ; *c*, is a cock, to regulate the supply of oil to the burner ; *b*, is the burner tube, made on the same principle as fig. 2, with air regulators, oil cup, grating, and other necessary appendages ; *f*, is the ornamental mouth of a pipe, which receives the overflowing oil from the cup, and conveys it to the upper chamber, from whence it passes through the valve *h*, to the lower chamber *i*. There is a communication with the vase *a*, by a pipe *l*. By the action of the pump *k*, the oil collected in the lower chamber *i*, can at any time be returned or carried to the vase *r*.

"The handle of the pump rises out of the base, so that it can be conveniently worked; it may be ornamented in any way; *h*, is a valve which is always open, unless the lower chamber is filled with oil, when it rises and carries the rod *q*, through, by which notice is given that the lower chamber or reservoir is full. The valve *h*, has a cork bottom, or other light material that will cause it to rise; this valve may be applied to figs. 1, 2, and 3, if desired; *p*, is a valve with an air hole through its top, and is on the same principle; it is made of cork or any other light material, to float when the ball is filled, either from the top through the aperture, or from the reservoir by the pump; they have both leather on their tops, and the one that acts in the vase rests on wires, so as not to stop the aperture when oil is to be poured in; this also prevents any oil being forced over by the pump.

"The pump *k*, is made after the usual method of pumps, and may be varied according to the form of the cylinder; *s*, is the flooring, over which the oil flows to the burner tube from the vase *a*; this lamp can have any number of burners attached to it.

"In fig. 6—*a*, is a vase or circular rim above the burner containing oil; *c*, is the cock, to regulate the supply of oil to the burner; *b*, is the burner tube, same as in fig. 2, with gallery regulators, although not shewn; *d*, is a pipe to carry the oil from the rim to the burner; *e*, is a pipe which screws on to the mouth of the pump pipe, to conduct the oil from the lower chamber or reservoir to the rim; *h*, is the oil cup, with grating, to let the overflowing oil pass to the reservoir; *i*, is the part of the pump pipe, into which the pipe *e*, is screwed. The pipe coming from the pump must be sufficiently secured by braces, to enable it to support the weight brought on it by *e*.

"Fig. 8, is the same, except that the cock to regulate it is placed nearer the rim, and the supply enters above the screw; *p*, is the valve, the same as described in fig. 5; the oil cup, as shewn in fig. 6, is only attached to the vase and burner when the pipe *e*, is screwed into it. These lamps are filled at the valve *p*. The lamp or lanthorn, fig. 9, only receives air directly through the bottom of the oil vessel; the air is thus brought into immediate contact with the flame, and to effect that purpose with more certainty, a circular plate, having an aperture in its centre to receive the wick, is shut down upon the opening through which the air comes to the flame; this circular plate is shewn in the section at *a*, as lifted up on its hinge on the occasion of trimming the wick. The oil vessel is moveable, and can be taken out; it passes through a groove, by which means the external air is better excluded. It is (as before stated) intended, that no air shall be received but at the bottom, by which the brilliancy of the flame is greatly increased and the smoking prevented; and to secure this lamp from being blown out by any violent gust of wind, there is a swinging tube of leather, or other flexible substance, with holes at the bottom, and rings to keep it distended, so that the air may never be entirely excluded.

"The beneficial effect of this plan is, that the flame cannot be put out, as the mouth of the leather pipe will always be opposite to the part from whence the wind blows; and for further security, the top of the air pipe which enters the lamp has a plate of metal, raised about a quarter of an inch above its mouth, that the air received through it may be properly diffused.

"When used for lighting lobbies, passages, or against houses, the air pipe may receive its supply from a box or other place, protected from sudden and violent gusts

of wind. The top part, shewn in the section, is made on the principle of the smoke jack, to carry off the heated air, and also to prevent gusts of wind from entering above the flame; it is surrounded by a case full of holes, which is so acted on by the wind as to always turn the opening of the ventilator from it.

"To this lamp *a*, is the plate through which the flame passes, and which brings the air into contact with it; *b*, the oil vessel, having a space round to let the air rise to the flame, the part which holds the wick being connected with it by a pipe, to receive oil to supply the wick: the air consequently circulates freely below the flame, and is brought into close contact with it by the plate; *c*, is the pipe up which the air rises; *d*, is a leather hose, screwed on to the mouth of the pipe, to prevent any violent gust of wind entering to extinguish or disturb the flame; and is of sufficient length to give it play; it has also rings, to prevent its closing and entirely shutting off the air when violently acted on; *e*, is the metallic top, full of holes, to let the heated air pass out, *f*, is a fly, which works on a spindle; *i*, is a plate to regulate."—[*Inrolled in the Inrolment Office, May*, 1828.]

To LEMUEL WELLMAN WRIGHT, *of Mansfield Street, Borough Road, in the county of Surry, Engineer, for his invention of an improvement or improvements in the construction of wheel carriages, and in the machinery employed for propelling, drawing, or moving wheel carriages.*—[Sealed 15th April, 1828.]

THIS invention is a peculiar mode of constructing the carriage, and its appendages, of a loco-motive engine, the ac-

tuating power of which is to be derived from the elastic force of compressed air.

SPECIFICATION.

"My invention of improvements in the construction of wheel carriages, and in the machinery employed for propelling, drawing or moving wheel carriages, is particularly described and ascertained in and by the drawings hereunto annexed, and in the following description thereof:—

"Plate VII, fig. 1, is a plan or horizontal view of the machinery and working parts of a wheel carriage; fig. 2, is a side view or elevation of the same, and the several letters refer to the same parts in both these figures; *a, a, a, a*, is the frame work upon which the engines, machinery, and body of the carriage are mounted; *b, b,* are two metal cylinders, containing compressed atmospheric air, which are filled through the pipes and cocks *c, c,* either from a stationary reservoir or otherwise; from these cylinders the air is allowed to pass in such quantities as may be required through the pipes and cocks *d, d,* (which may be worked by hand or by gear from the other parts of the machinery) into a third cylinder *e, e,* where the air is rarified and rendered more elastic before passing into the cylinders of the two engines, by the heat from the furnace *f*, passing through the pipe *g*, into pipes within the cylinder *e, e*; when the air being heated, becomes more elastic, and its expansive force increased, it is then admitted through the supply pipe *h*, and slide valves *i, i,* (which are worked by the eccentrics *j*, and rods *k*, in the common manner) into the engines *l, l,* where exerting its elastic force upon the pistons and piston rods *m, m,* in the manner of steam in the common alternating steam engine, rotatory motion is communicated by the connecting rods *n, n,* to the cranks *o, o,* the shaft *p*, and the drums *q, q,* which are connected by the bands or straps *r, r,* to the

drums *s, s*, which are affixed upon the naves of the running wheels *t, t*, thus communicating motion to the wheels and propelling the carriage.

" Steam may be generated by the furnace *f*, in a small boiler, or pipes, and be then conducted to the cylinder *e, e*, where giving out a portion of its heat to, and combining with the compressed air, the air is thereby rendered more elastic. The heat or steam from the furnace *f*, may be conducted to the engines (without using the third cylinder *e, e*,) and there unite with the compressed air from the cylinders.

" By any construction of proper connecting gear, the man having charge of the machinery, may control the working of the engines, valves, cocks, and force pump, and stop, or abate the speed of, or set the carriage going, as may be requisite. A crank or eccentric motion may be added to the shaft *p*, and by a connecting rod, work a pump, to compress and force air into either of the cylinders, when the carriage is going down hill, and which will also serve as a break to check the speed in descending.

" When the carriage is to be guided out of the straight line, the winch handles 1, 1, are to be turned round, and the bevel wheel on their shaft 2, acting on another bevel wheel, on the end of the upright rod 3, communicates motion to the drum or pulley 4; upon this pulley are attached the ends of two chains or cords 5, 5, their other ends being connected to the drum or pulley 6, upon the shaft 7; on this shaft is another pulley 8, with the ends of the two chains or cords 9, 9, fastened to it, their other ends being connected to the opposite ends of the axle 10, 10, of the fore wheels 11, 11; upon motion being given to these drums, the chains are wound on, and off them, and cause the axle tree 9, 9, to turn out of the right angle, to the track of the carriage, thus causing it to travel in a curved line.

"At different stations of the road on which the carriage is intended to travel, strong metal reservoirs are to be placed, which are to be filled with atmospheric air, compressed to the required density, by a common force pump, worked by steam or water power. From these reservoirs, the air passes through proper connecting pipes and cocks into the cylinders *b, b*, contained within the carriage, as often as the same may require to be filled, whence the air passes to the third cylinder *e, e*, in the manner before described, in such quantities as will keep up a sufficient supply to the engines.

"Fig. 3, is a representation of a rotatory engine, adapted to work machinery for propelling carriages, one of the side plates being removed to shew the interior; *a*, is the induction pipe; *b, b*, two piston leaves, moving on hinge joints within the interior cylinder *c, c*, fixed on the shaft *p*; the combined air, and steam, or heat, exerting its expansive force against the piston leaves *b, b*, carries them with the cylinder *c*, and shaft *p*, round, until the piston leaves pass the eduction pipe *e*, when the stop piece *f*, causes them successively to close as they pass under it, to come into the situation where each respectively is thrown up into the position shewn in the drawing, by the trip levers *g, g*, striking against the friction roller *h*, and thus maintaining a rotatory motion, which is to be communicated by the straps and drums as before described, to the carriage wheels, for propelling the carriage.

"The carriage represented in the figures is adapted to carry passengers and goods, as well as to employ its locomotive power in drawing other carriages after it; I do not however mean or intend hereby to claim as my invention the particular parts of which the same may be composed, excepting as applied to the propelling, drawing,

or moving wheel carriages by the agency of compressed air, heated and used in the manner above described."

[*Inrolled in the Inrolment Office, Oct.* 1828.]

Specification drawn by Mr. Berry.

To WALTER HANCOCK, *of Stratford, in the county of Essex, Engineer, for his invention of an improvement or improvements upon steam engines.*—[Sealed 4th July, 1827.]

THE subject of this Patent may with more propriety be called, an improvement in the construction of boilers for generating steam, than of steam engines, as it has no reference to engines except in the necessary adaptation of a boiler of some kind to provide steam for putting the engine in operation.

The Patentee proposes to construct his boiler of a series of flat tubes, of considerable breadth and length, but of very little thickness, in order to expose a very greatly extended surface, for the action of the fire, upon a series of thin stratums of water. These tubes or flat vessels of water, are to be placed in vertical positions in a furnace, and to be connected together by horizontal pipes or tubes, so as to constitute the whole series of tubes as one vessel, the water occupying the lower parts, and the steam of course rising to the top, and passing off by suitable channels to the induction valve of the engine.

The contrivance is proposed principally as a mode of constructing boilers or generators, for loco-motive carriages, as the small capacity of the tubes or vessels holding but little water, renders the whole comparatively light: though the evaporation, by the extended surfaces must go on very rapidly, and of course a large volume of steam will be given off.

The mode of constructing these boilers as shewn in plate VI. fig. 11, is a perspective view of one of the tubes or vessels detached; it is formed by a long plate of thin metal, the ends of which are to be braced or riveted together; the plate is then cut into the shape exhibited, and two iron bars *a*, with openings or eyes *b*, *b*, of thin ends, inserted at the outer edges or sides of the vessel to which the plates are secured by rivets, or screws. A flat tube is thus formed with an extended surface, but of small thickness, and it is kept from expanding or collapsing by studs placed within at certain distances apart, and secured by screws or bolts, with rivets passed through both surfaces of the plates.

The enlarged or cylindrical ends of the tubes constitute chambers at bottom and top, for the passage of the water and steam, and when a series of these vessels are combined, the water and steam flow freely from one vessel to another.

A series of these tubes are shewn correeted and in section at fig. 13, with the other parts, constituting a complete boiler. There are four holes perforated through each of the tubes at *c*, *c*, *c*, *c*, with rings inserted in them, and these have small apertures for the purpose of letting out the water and steam into the longitudinal tubes *d*, *d*, *d*, *d*, fig. 11, when the whole of the boiler is put together nd in action.

The detached fig. 12, shews a ring *d*, with a bolt and nut *e*; one of these rings *d*, is placed against such of the apertures *c*, between the vertical tubes or vessels, as shewn in fig. 12, covering the apertures *c*, *c*, and fitting very closely with packing, and a bolt being passed through the whole series and screwed up tightly by means of the nuts *e*, *e*, the whole series of tubes are combined

and free ways are formed for the passage of the water and steam from one vessel to another.

End tubes f, f', fig. 13, are constructed and united in a similar manner, and they as well as the tubes d, all lead into a flat chamber g, at top, in which the steam revolved through k, k, and from above it is passed off by a pipe to the indication part of the engine. The water for supplying the boiler is injected at the lower pipe i, i, combined and secured in a similar manner to that above described, and from thence it pours into the other vessels. The bars of the furnace k, k, rest upon the lower pipes, and the flame and heated vapour, from the ignited fuel ascending out against the surface of the tubes, and causes the steam to be generated copiously; the smoke passing off into the chimney, by channels l, l, made through the horizontal chamber g.—[*Inrolled in the Petty Bag Office, January*, 1828.]

To GOLDSWORTHY GURNEY, *late of Argyle Street, Hanover Square, but now of Albany Road, Regent's Park, Mary-le-bone, in the county of Middlesex, Surgeon, for his invention of certain improvements in loco-motive engines, and other applications connected therewith.*—[Sealed 11th October, 1827.]

THE invention which constitutes the subject of this Patent, was intended to perfect the steam coach, which acquired so much notoriety some time back.

It is known to our readers, that though all the world appeared to be satisfied that the great desideratum, a steam coach, running upon ordinary roads, was at length

achieved, we entertained considerable doubts upon that snbject; and therefore anxious to allow the inventor every possible chance of success by giving him time to arrange such modifications as experience might prove to be necessary; we have withheld our report of this patent, much longer than we should otherwise have done; still, however we are in the same state of doubt, for by nothing that we have yet seen are we enabled to say, that the project of driving a coach upon an ordinary road, by means of steam is yet proved to be *practicable.*

The present improvements are represented to be not new in principle, but arrangement of the parts necessary to a steam coach, than has been heretofore adopted, indeed the greater part of the details of the machinery, are described in the specifications of former patents granted to the same gentleman, see our first Series, Vol. XIII. pages 74 and 77.

The general construction and arrangement of the parts of the steam coach, according to this last improvement is shewn in plate VII, at fig. 4, which is a section taken longitudinally through the coach, and through the boots and other parts, which enclose the machinery *a*, is the furnace and boiler, which is situate in the hind boot. The boiler consists of a series of pipes or tubes of small capacity, which are bent and twisted in various directions, and enclose the fire within their coils. These tubes being filled with water, cause a quantity of steam to be generated at a tight pressure, which is conducted to the eduction aperture of two steam engines *b*; the actions of the pistons of which drive the carriage.

The pipes which constitute the boiler, discharge the steam and heated water into the horizontal cylindrical tubes *c, c*, and those in the vertical tubes *d, d*, called separators; from those vertical tubes the steam passes

through a pipe *e*, to the engine, but the water which has been separated from the steam, runs again into the boiler by another channel; *f*, is a safety valve, provided at the top of the steam pipe to prevent explosion, and a throttle cock *g*, is placed near the conductor's seat in front to regulate the supply of steam, and consequently the speed of the carriage.

The tank for the water is placed under the carriage at *h*, and a small steam engine is placed at *i*, for the purpose of working the pump *k*, which supplies the boiler with water, and for actuating a rotatory fan *l*, which constitutes a blowing apparatus for keeping up the fire in the furnace within the boiler; the current of air passing through the channel *m*, *m*, under the body of the coach into the furnace behind. The blower may be occasionally worked by a wheel when the fire is to be raised, or by an attachment to the running wheels, and a damper may be introduced to regulate the supply of wind.

The carriage is driven by means of the rods *n*, which are connected at one end to the piston rods of the engine *b*, and at the other end to the cranks *o*, *o*, on the axle of the hind wheels of the carriage. Thus the hind wheels being driven round, the carriage is impelled forward.

The conductor placed on the seat in front, has hold of the end of the lever *p*, by which he turns the pilot wheel *q*, in such direction as may be desired.

There is a spring *r*, connected by chains with the pilot wheel, which keeps the wheel in a direct line of motion, when the lever is not restrained by the conductor, as in turning; and *s*, is a break or drag for stopping the rotation of the hind wheel, in going down hill. It is also proposed to connect propellers (we presume legs) to the crank rods *n*, if occasion should require.

The framing of the carriage and its body, may be made in various forms, and the details of the mechanism may be differently modified, but as nothing now is proposed in their construction or adaptation, and they are generally known as parts of all other loco-motive engines, it is unnecessary to go into more minute description as the patentee's claim of invention consists simply, in the arrangement of previously known contrivances as above described, and not in the parts themselves, which are either embraced in his former patents, or are already common property. —[*Inrolled in the Inrolment Office, April*, 1828]

Novel Inventions.

Improved Gearing Chain.

An ingenious and useful construction of gearing chain for connecting cog wheels, has lately been invented by Mr. Oldham, engineer, of the Bank of Ireland, which we think highly deserving of the attention of machinists, as it is so extensively applicable to various kinds of machinery, such as carding engines, and indeed in almost every situation where a series of toothed wheels are required to be driven by one mover. It consists of a peculiarly constructed chain with curved links, which when passed round a drum will serve as teeth and act as a cog wheel to turn pinions, &c. and when stretched out straight, or placed on a flat surface, will form an endless rack. It may also be passed over and under a series of rollers, pinions, &c. forming a carrying chain instead of the commonly constructed chains, in which spiked wheels are employed to take into the links of chains in carding engines, and various other kinds of machinery.

This improved chain will work with much better effect in connection with pinions, or wheels with common teeth, into which it is suited to gear, without the possibility of slipping off, or riding over the points or spiked wheels having a broader surface of contact, and is not at all liable to get out of order, being much stronger than the old linked chain and spur pinion.

Plate VII. fig. 5, is a side view of a portion of the improved chain. Fig. 6, is a plan view of the same, that is formed by crescent shaped plate constituting links, which are connected together in pieces, that is one and two alternately, or two or three or more placed side by side, the alternate links fitting in between each other at the joints where they are connected by pins or bolts passed through their eyes in laternal directions.

It will be seen that these curved links present on one surface of the chain, a simicircular hollow, like a rack for the teeth of the pinion to take into, and that the ends of the links, when the lath or rivets are passed through are formed semicircular, and the same size as the space or hollow of the link. These ends constitute teeth on the chain, and take into the spaces between the teeth of the pinions or wheels, and consequently drive them; or the chain itself is driven by such pinions or wheels in the same way as a rack.

It is obvious that such a chain may be passed in various directions over wheels, on its face, and over drums at its back, and may be used with certainty of effect, as whatever motion is given to the chain will be communicated to all that it is in gear with.

Fig. 7, shews such a chain, supposed to be endless, carried over part of the periphery of a carding cylinder, and constituting a circular rack or toothed rim, which drives all the pinions connected to it; the back of the

chain is conducted over a roller, and brought into gear with other pinions or wheels; but as numerous illustrations might be produced of its applicability, it is unnecessary to say more, as its adaptation to a very wide range of machinery will at once be perceived by every practical mechanic.

Improved mode of coupling Machine Bands or Straps.

Mr. E. Budding, of Stroud, Gloucester, the recent Patentee of an ingenious machine for mowing lawns, has lately invented a new mode of uniting the ends of leather straps or bands, employed in driving machinery, which, from its simplicity and perfect security, will beyond all doubt, be adopted in every mill and manufactory where leather strapping is made use of instead of lacings, thongs, rivets, or buckles.

In some mills where very long bands or straps are used, it is customary to secure the several pieces together by rivets to form the whole length of strap, and to attach the two extreme ends by lacings, so as to allow of adjustment. This mode of fastening is objectionable, as the hammering of the rivet, unless very carefully done, is liable to bruise and injure the latter, and frequently causes them to break, as such parts when in use serve to make a screw joint. Many rivets must be used which is both expensive and troublesome.

Fastening straps with lacings or thongs is also objectionable, as they require many holes to be pierced through the straps, which weakens them, and when they require adjusting, a considerable time is lost in unlacing and relacing them again, to take up a hole, during which time the machinery must stand still; and the lacings, in passing over the drums, are often cut, and very soon wear through, thus producing delay and expence, and injury to the machinery. These disadvantages are so well known to all practical men, who have the superintendance of machinery, that we feel convinced any attempt to obviate them will be acceptable to our readers.

Mr. Budding's plan consists in employing studs, or metallic buttons, the shanks or stems of which are hollow sockets, having a female screw cut in them.

The stem or shank is as long as the thickness of the two pieces of strap when combined, and is made truly cylindrical, fitting the holes punched in the straps at the proper places of union. When the holes in the end of the the strap are brought together, the socket or shank of the stud is introduced through them, with the button or disk on the underside, and a screw with a large flat head is screwed tightly into the socket of the button, which compressing the leather between the buttons, and the screw head, as it becomes tightened up, keeps the two peices in close contact, and produces a tight and screw joint, the strap being as pliable at the junction as at any other part.

Plate VII, fig. 8, to a view of the two pieces of strap fastened together, as seen on the upperside ; fig, 9, is an edge view of the same ; fig. 10, is a representation of the button or disk with its socket rim and the top screw seperated from each other: fig. 11, a representation of them when put together.

When two pieces of strap are to be united, it is only necessary to punch the holes of the proper size, to suit the stem of the bottom intended to be used, and on bringing them together, the socket is to be introduced through them, and then the large headed screw introduced into the socket and screwed tight up.

It is obvious that this operation will take but little time, and a stop can be unfastened and a hole let out or take up and fastened again in a few seconds.

Straps of sufficient strength and thickness, will require different size buttons and stems, according to the rate they have intended to do. They are generally used three together for securing one junction of the straps, for all ordinary purposes of machinery, but for a steam engine strap perhaps five may be required, more than five is seldom necessary, unless to an engine of very great power.

The operation of attaching the straps by these studs is greatly facilitated by the use of a punch of a rather novel construction, likewise invented by Mr. Budding, the form of which is shewn in fig. 12. It consists of a clamp *a*, through which is passed the thumb screw *b*, on the lower end of which is the punch *c*. When the straps are adjusted, they are held between the clamp as at *d*, and the thumb screw turned round, when the punch will cut a perfectly clean hole through both straps at once.

On the band of the clamp is the concave piece of steel *e*, which is file cut on its surface; when the socket of the button has been introduced into the hole, this concave piece is placed against the button, at the underside of the strap, and held in contact with it, while the screw is driven up tight, the rough file cut surface preventing the button from slipping round. Different sized punches may be fitted to the thumb screw or clamp, to suit the sockets of the different sized buttons, some of which are made small enough to connect the leather straps of carriage harness, and it would be very desirable if stage coachmen and guards were to carry a few of these buttons in their waistcoat pockets, in case of accident,

These studs are sold from 3*s*. to 4*s*. 6*d*. per dozen, according to the size.

Improved Pocket Thermometer.

An ingenious adaptation of the Pyrometer has recently been manufactured by Mr. Wrench, philosophical instrument maker, Gray's Inn Terrace, which answers most of the purposes of a thermometer, and which, for scientific purposes, must evidently be very superior to any thing

of the kind hitherto introduced. The operating part of the instrument consists of a circular bar or ring of steel, and a similar ring of brass, both cut open, to allow of expansion. These two rings are placed in contact, something like a compensation balance of a chronometer, which by expansion and contraction, through the means of a delicately contrived spring, gives motion to an index, which points out the degrees of heat or cold, on an enamelled plate. The instrument is about the size of a common pocket watch, and will be found very useful by its extreme portability, is not so likely to be broken as a glass tube with moving. It possesses all the delicacy of thermometrical observation that could be desired.

This instrument may be relied upon in preference to any other thermometer that has hitherto been introduced; the expansion being under all circumstances equal, and having a most decided advantage over the glass tube instruments, where a variation frequently is found to arise from the increasing of the bore of the tube, and the consequent variation of effect, from the difference of the capillary attraction of the mercury on the sides of the column.

In Plate VI. fig. 14, represents the instrument, a portion of the dial plate being removed to shew the parts within. It will be seen, that one end of the open ring is secured by a screw firmly attached to the plate, while the other end is left open. The ring is composed of brass within and steel without, and a small piece projecting from its extremity, rests against the arm of the pendant toothed segment. This toothed segment takes into a very small pinion in the centre of the plate, which is upon the axle of the index and a very fine coiled spring is connected to the axle, which draws the index round in one direction, while the expansion of the ring forces it in the opposite direction.

When by an increase of temperature, the circumference of the ring elongates, the arm of the pendant segment is pushed to the side, and by the same act the pinion is turned, and the index carried round the dial plate, indicating the degree of heat; when the temperature becomes reduced, the metal ring shrinks, and the spring coiled round the central axle, brings back the pinion, and the toothed segment and the index points out the degree of cold.

The variations of temperature are not so quickly indicated in this instrument, as by the mercurial or spirit thermometer, but the expansions of the metal ring not being so subject to error, a more perfect thermometer may be constructed upon this principle, and in our opinion, more convenient than the old kind, and more elegant in appearance.

REPORT

Of the Select Commitee of the House of Commons on the Laws of Patents.

(Continued from page 114.)

Thomas Aspinwall, Esq. called in; and examined.

You are Consul of the United States of America, resident in London?—I am.

Are you acquainted with the American law of patents?—Yes.

Is the American law pretty nearly the same with the English law?—In many respects it is very different.

What is the term for which patents are granted in America?—Fourteen years.

Do they grant patents for any shorter period, at the option of the inventor?—No.

Does any considerable length of time elapse, between the application for a patent and obtaining a verification of it?—No more than is necessary for the simple transaction of the business. It may be got through in a day if persons will attend to it, and the length of the papers admit of it. The Attorney General is allowed fifteen days for examining them, in order to ascertain whether they are conformable to the statute, but the great simplicity of the documents enables him to perform this duty with the utmost promptitude in ordinary cases.

Are they required to enter an accurate description of the invention in any public office?—They are.

Is that description secret or open?—It is open. The description must be such as to distinguish the invention from all others that have preceded it; and if it be a machine, it must be in such terms as to enable a workman to make it; or if it be a composition of matters, so that it may be compounded; this description is made a part of the patent, and must not refer to drawings or the model, if it can be avoided. Wherever the requisite clearness cannot be attained without such references, the applicant furnishes two sets of drawings, one of which is attached to the letters patent.

Will you have the goodness to describe the mode of application for a patent in America?—The first step in the process is the payment of about 6*l.* 15*s.*, or thirty dollars of American currency, into the patent office. The applicant obtains duplicate certificates of that payment, and takes one of them to the office of the Secretary of State, to whom, at the same time he presents a petition applying for a patent for his invention, describing it shortly. He annexes to the specification, which generally accompanies the petition, an oath, that he is the true discoverer of his invention, and that he is a citizen of the United States; those two facts are all that is required in the affidavit. The Secretary, if there be no interfering application, immediately assents to the letters patent being granted, and the papers are then taken by the applicant to the patent office, where the specification, signed by himself, and attested by two witnesses, is then lodged, accompanied with drawings; and if it be a description of a machine also, with a model, if the Secretary directs it shall be so, in order that there shall be no mistaking the exact nature and extent of the invention. This whole process may be accomplished in half a day, if there were a person on the spot to attend to it, and if the necessary writings could be made within that time. When the letters patent are prepared for signature and sealing, they are submitted to the Attorney General of the United States, who within fifteen days, if he finds them to be conformable to the Acts of Congress on the subject, returns them to the Secretary of State, who presents them to the President for signature, and causes the seal of the United States to be affixed to them. After being recorded in the books of the proper office in the department of state, the letters are delivered to the patentee or his order.

Are any means taken to ascertain, whether the person has given an accurate description of his invention beyond that of requiring a model?—No, he may be told by the superintendent, or other officer of the patent office, that his description is imper-

fact. It is, however, not very likely, in the present state of the patent law, that the letters patent will be refused on that ground, but still they may be avoided afterwards in a court of law, on account of imperfections in the specification

Is it at the option of the Secretary of State to compel him to give a model or not?—Yes; he is always obliged to furnish drawings as a matter of course, and a model at the option of the Secretary.

Does it often happen that models are required, or are they content with drawings in most cases?—They require models whenever the machine is complicated.

Is the inventor himself apt to desire, that a model should be deposited in order to secure the invention to himself?—From personal knowledge I cannot say.

Are patents often set aside in America from imperfection in the description?—Sometimes, but not very frequently, they have been set aside for want of form in the specification; they have been set aside for some very substantial cause, such as the invention not having been an original one; that it was a second discovery of the same thing, or that the specification, in some part of it, only claimed what was previously known.

Are they often set aside for an imperfect description of the way of making the machine?—I know of but one case of that kind, they may be annulled for claiming or including more than the invention.

Are piracies very frequent?—They have been attempted, but a reference being always easily made to the patent office, and in such a case if it be found on examination that the invention has been patented in due form, there is no difficulty in getting damages in a court of law.

What is the mode of trying a patent right in America?—After a patent has been issued, the right of the patentee may be tried in two ways under the statute, either upon a rule of court to shew cause why the patent should not be annulled, founded on the affidavit of any person filed in the district court of the district where the patentee resides, and alleging that the patent was obtained surreptitiously, or upon false suggestions; or, secondly, in a suit brought by the patentee for an infringement. In the latter case, the defendant may give in evidence under the general issue, any special matter of which notice is given thirty days before trial, tending to prove that the patentee's specification does not contain the whole truth relative to his discovery, or that it contains more than is necessary to produce the desired effect; which concealment or addition shall fully appear to have been made for the purpose of deceiving the public; or that the subject of the patent was not originally dis-

covered by the patentee, but had been previously in use, or described in some public work, or that he had surreptitiously obtained a patent for the discovery of some other person.

Then the *onus probandi* falls upon the person opposing the patent?—Yes, in the latter mode of trial. Besides those two methods of trying a patent right, it is conceived that a *scire facias* would lie at common law to compel a patentee to show cause why his patent should not be avoided. The patent right might also be tried in Chancery under an application for an injunction.

In the case of a piracy, in which the patentee prosecutes the person infringing his right, is the process for recovering damages easy or not?—It is as easy as to bring to a close any other suit at law.

Is it in America the most common way for a person to attack the patent in a court of law in the way you have described, in order to set it aside, or at once to pirate the invention, and leave the patentee to seek the remedy in a court of law? I think it most general to pirate the invention whenever the patent is supposed to be invalid, but not otherwise; because in that case, if it were a valuable invention, and if it were asol one that was likely to excite public curiosity, or incapable of being secretly put in operation, the patentee would immediately come down upon the invader of his rights with a suit at law, and recover treble damages. Most of the reported cases are suits for infringements.

Are there many cases within your knowledge, where patentees have brought actions and failed in recovering damages?—I am not able to say definitely; five or six, certainly.

Does a patent run over the whole of America, or only over one particular state?—It goes over the whole of the United States.

You state, that for three years it is liable, in the district courts, to be questioned; is a patentee safe after three years? —After three years he would not be liable to be called into court in that way, at the instance of any person who chose to question his rights; but when his patent is infringed, he must either submit to the infringement, or else he must bring it into court; but previously to his patent being granted at all, if there be a conflicting application, the parties would be required each of them, to nominate an arbitrator, the Secretary of State would nominate a third, and it would be left to this arbitration to decide which of the claimants was entitled to the patent.

In trials of patents, are arbitrators ever appointed by the court to settle them?—They may be by consent of parties, but not without the consent of parties; they would examine witnesses, experienced persons, as in other cases.

Does the inventor send in his specification to the Secretary of State finished at his first application?—It is not necessary that he should exhibit his specification to the Secretary of State, except perhaps the form of the documents may make it convenient to annex them altogether.

How long afterwards would it be necessary to lodge the specification?—He may lodge it immediately, as soon as he has got the assent of the Secretary of State that the letters patent should issue; but it is not necessary that the Secretary should know any thing at all of the merits or the justice of the application, he depends entirely upon the allegations of the parties concerned.

How soon can he be compelled by law, after his patent is granted, to put in his specification?—If he does not choose, he may never do it; but after paying the thirty dollars, the patent almost always issues as a matter of course. There is no obligation upon him to furnish any specification, but if he does not, he cannot get his patent.

Is the specification given in before the patent is ratified?—Yes; the Secretary of State of course orders the patent to issue upon the petition and affidavit. It will not however issue, unless the specification be lodged, because the latter is inserted in it, or forms a part of it. There is no obligation to lodge the specification, if the party does not choose to take out the patent. The patent would not be issued without the specification, but the specification must be lodged first.

You have said that a person can obtain a patent in a single day?—Yes, if the papers are completed and approved by the Attorney General.

When he has received the order from the Secretary of State's Office, would that be a protection to him till the patent is taken out?—It would be a protection to him in a certain way, it would secure him against interfering applications. But supposing him to delay a year, during which another person uses the invention, his specification happening not to be lodged in the patent office till the expiration of a year, I should consider that he would not be entitled to any damages for an infringement of his patent during that time, but he still would be entitled to his patent.

What is the usual time that inventors take to make out their specifications?—It varies of course very much according to the complexity or length of the specification.

Does the patent right take effect from the moment the Secretary of State has signified his willingness to grant the patent, tor from the time when the patent is sealed: it runs from the time when the letters patent are dated, at which time they are n a state to be delivered to the patentee.

Supposing an inventor was to delay putting in his specification for several years, would the public still be precluded from using the invention ?—Not at all, he would have no patent. It is barely possible that an injunction might be obtained if the delay were unavoidable.

Will you have the kindness to explain, how far a patentee is protected in the interval between obtaining the assent of the Secretary of State and the completion of his patent, by lodging the specification ?—The answer to a certain degree must be hypothetical, because the patent is almost always completed ; and the specification and petition go together, at least they are all furnished at the same time, therefore, practically, I doubt whether I shall be able to answer the question ; but as a matter of inference, I should say, that as the patent can have no force previously to its existence, if the completion of the patent were delayed during the interval of delay, the invention might be made use of by any body, unless perhaps specially restrained by an injunction from Chancery.

When the patent is completed, then would the individuals who had availed themselves of that invention, during the interval between the Secretary of State's assent and the completion of the patent, be prohibited from continuing to avail themselves of that invention ?—Decidedly so ; the pirate would be precluded from any use of it, because a patent in America, being granted only to the inventor, the right to the monopoly is complete the moment the letters patent issue ; and the inventor alone, or his legal representatives, would have a right to make use of the invention.

Can an individual, having obtained a patent, sell that patent to another ?—Yes, and it also descends to his heirs ; he may dispose of it to any body without limitation. It is just like any other property. There is a circumstance somewhat material that I would mention, if an inventor dies previously to securing a patent, his heirs, or even his devisees would have a right to take out the patent after his death, in the name of the executor or administrator as trustee.

You have stated that the specification and the petition generally go together ?—They generally go together as a matter of convenience.

But you say that the Secretary of State does not require any description in order to give his consent to a patent ?—He does not require it to be presented to him, but it is lodged in the patent office, which is a branch of his department. As a matter of convenience it generally accompanies the petition ; the whole of the writings, prepared by the applicant, are generally on two sheets of paper.

You are perhaps aware, that in England a patent cannot be granted to more than five persons; is there any limitation of that sort in America?—There cannot be five inventors of one thing; but the patent right may be disposed of to any number without limit.

Are American patents granted to foreigners?—If they have resided two years in the United States. A foreigner who has not resided two years, cannot get a patent as a matter of course, under the patent law; but Congress has the power of dispensing with the two years residence by special act.

Are persons taking out a patent in America, under any condition, that they shall not take out a patent in any other country?—Not at all.

Supposing that several months elapsed before the specification was put in, and the patent completed, have other persons power by obtaining access to the patent office, of knowing what the inventor is about?—A person would have the same means of discovering it that he would have of discovering the business of any other office, but it is not open to the public; I dare say there would be no particular secrecy made use of on the subject; but still it is not customary to make applications at the patent office, with the view of crossing the purposes of the inventor, because there cannot often be two persons claiming patents as inventors of the same thing. The principle as I have remarked before, of the American patent law, is somewhat different from that of England. It is granted there as a reward to the inventor. Here a patent is granted as a reward to any person for bringing the invention to the knowledge of the public, whether he be the inventor or not.

In what part of the United States is a patant right tried?—It is tried where the patentee resides, if he is to be called upon to shew cause why his patent should not be avoided, but it may be where either party resides in other cases.

If the patentee brings an action for an infringement of the patent, is it at the option of the patentee where it shall be tried?—It must be tried at the place where the person sued resides.

Is there any mode by which an English patent can be afterwards patented in America?—Not if it has been known or used here. There is a peculiarity in the patents granted to Americans. They are not required to make affidavit that the invention has never been made known or used in any foreign country. A foreigner is obliged to make that oath, but an American may be presumed, of course, to have originated all his inventions within his own country. It is probably, however, an accidental difference between the two oaths.

Is he allowed to get a patent for an invention from a foreign

country which he has not himself invented?—He cannot get a patent for it. There are no patents of importation.

He is obliged, in all cases, to swear that he is the inventor? —Yes.

Supposing an Englishman were to invent something that he believed would be particularly useful to the United States, must he go to America in order to take out a patent for it?—He must go and reside there two years before he could obtain a patent as a matter of course, but by petition to Congress he might probably have the two years residence dispensed with. Foreigners have obtained special acts of the legislature, directing patents to issue for them even when they have not resided at all in the United States. An instance in point is that of Brown's gas engine, but that was the last; and a member of Congress, who had been upon the committee that brought in the Bill, said the dispensation was granted under a misapprehension that the petitioner was residing in the country.

How long ago was that?—Four or five years.

You have stated, that the specification is usually open to the public, are there any cases in which the legislature interferes to require it to be kept secret?—None.

Supposing the invention is not used for a great number of years, does the party lose his patent?—No, his patent is good for the fourteen years; he is not required to carry it into use at all. It is probable, that if he were to commence an action against a person for an invasion, he would, in that case, get very little damages. That being the natural course I suppose, it is considered not to require any particular provision.

Are patentees in America in the habit of granting licenses to persons to work the invention?—It is very common.

Are they obliged, if they grant it to one person, to grant it to others?—No; it is entirely optional.

Do you know whether licenses are sometimes granted to particular parties, on condition that they shall not be granted to others?—I am not aware of any circumstance of that kind.

Can you state whether, from the cheapness of patents in America, a very great number are taken out?—About two hundred annually.

Is the number found to be any inconvenience; is there any complaint of the number of patents that are taken out?—Not at all.

You have stated, that thirty dollars is paid on the first application; is that the whole expense of the patent?—That is the whole expense. The party may possibly go to a lawyer to have his petition drawn up, and to have his papers put in order, for which the highest rate of compensation there is about 4*l.* 10*s.*: so that the whole expense of a patent would seldom

exceed about eleven or twelve pounds; the thirty dollars is all the official expense.

If a person makes an improvement upon his original invention, must he take out a new patent for that?—Yes; he cannot add that to his old patent.

After the patents are taken out, are they placed in any office of record, where every one has access?—Yes; and they have also a model office, which is at present a respectable museum, where all machines are deposited.

In most cases where a patent is taken out for machinery, is a model deposited?—Yes.

In chemical processes, what is done?—In chemical processes they give the different ingredients whenever they are required; and those are deposited in the same way.

Where patents are granted for chemical inventions, is any experiment made to know whether the result can be produced? —No; unless the head of the patent office chooses to do it for his own amusement.

Supposing he does, and finds that the thing does not answer, would the patent be refused?—If any person choose to call upon the patentee, to shew cause why his patent should not be avoided, on the ground that it did not answer the purpose suggested in the specification or petition, the patentee would be obliged to prove that it did so.

That is a process in a court of law?—Yes.

Attended with the same expense that any other action at law is?—It is a little more summary; a motion is made, on affidavit, to the court, and a notice issues to the party, at the discretion of the judge, to appear and show cause; and upon solemn argument, or in case the patentee fail to appear and shew cause, the rule may be made absolute, and the patent declared void.

Is there any complaint made of the incompetency of the courts, in some cases, to try those quesceions of patent rights? —I am not aware of that; the patent law prescribes the remedies. It is a matter regulated by statute, and of course the section of the law would indicate at once whether the court had jurisdiction or not.

As very often questions must arise, in which a considerable degree of science is required, to ascertain whether there has been an infringement or not, or whether the invention is a new one or not, have you ever heard it said that juries and judges are incompetent to try those questions?—I have not heard much complaint upon that subject; but I have some slight recollection of a cause that was tried in that way, and I remember very well that the counsel acknowledged their own incompetency.

In case it is attempted to set aside a patent, can such a prosecution be brought more than once by any party?—I do not think there is any legal provision against that; the party who had failed the first time, would of course again be saddled with costs if he failed the second time. The expense is the only general remedy against it.

Mr. *John Isaac Hawkins*, called in; and Examined.

HAVE you any information to give to the Committee with regard to the Spanish law of patents?—I have read over the Spanish patent law, and extracted the only points which I think require any consideration. They are contained in a law passed by the Cortes on the 2d of October 1820, and which was sanctioned by Ferdinand the 7th, on the 14th of October 1820, and they are as follows:—The inventor of a new machine or process is entitled to a patent for ten years. The improver of an old machine or process can only have a patent for six years; and the importer of a foreign invention only five years. An act of the Cortes can extend the period, in particular cases, not exceeding in the whole, fifteen years to the inventor, ten years to the improver, and six years to the importer The whole expense of the patent is, to the inventor 2,000 reals, to the improver 1,200 reals, and to the importer 1,000 reals. One half to be paid at the time of petitioning, the other half on receiving the patent; the specification to be presented at the time of petitioning. The specification is open to public inspection, except in particular cases at the discretion of the government. Any number of partners may hold and work a patent. If the Committee should wish for further information upon this subject, I would beg leave to refer them to a work, intituled, "*Traite des Brevets d'Invention, &c.* By Augustin Charles Renouard," which was published at Paris, in the year 1825. There is one point in this Spanish law which I would beg leave to make an observation upon, which is the provision giving different periods to different classes of applicants. It appears to me next to impossible to distinguish between an inventor and the improver of an old invention, and therefore I think such a distinction would create a great difficulty; but there is a broad distinction between an inventor and the importer of a foreign invention, and it might be worthy of consideration, whether a difference of period should be made between the inventor and the importer of a foreign invention.

Conclusion of Evidence in the House of Commons on the Laws of Patents.

New Patents Sealed.

To Henry Calvert, of the city of Lincoln, Gentleman, for his having invented or found out an improvement in the mode of making saddles, so as to avoid the danger and inconvenience occasioned by their slipping forward. —Sealed 26th October, two months for Inrolment.

To Jeffrey Shores, of Blackwall, in the county of Middlesex, boat builder and ship smith, for his having invented an improvement or improvements on tackle and other hooks, which he denominates the self relieving hooks.—1st November, 2 months.

To John Collinge, of Lambeth, in the county of Surrey, engineer, for his having invented an improvement or improvements on the apparatus used for hanging, or suspending the rudders of ships or vessels, of different descriptions.—1st November, six months.

To Benjamin Cook, of Birmingham, in the county of Warwick, brass founder, for his having invented an improved method of making a neb or nebs, slot or slots in shells, or hollow cylinders of copper, brass, or other metals, for printing calicoes, muslins, cloths, silks and other articles.—1st. November, 6 months.

To Lewis Aubrey, of Two Waters, in the county of Herts, engineer, for his having invented certain improvements in cutting paper.—1st November, 6 months.

To John Bowler, of Castle Street, Southwark, in the county of Surrey, hat manufacturer, for his having invented certain improvements in machinery employed in the process of dying hats.—4th November, 2 months.

To Joel Benedict Nott, late of Schenectady, in the State of New York, but now of Bury Street, St. James's, in the county of Middlesex, Esq. in consequence of a communication made to him by a certain Foreigner, residing abroad, for an invention of certain improvements in

the construction of a furnace or furnaces for generating heat, and in the apparatus for the application of heat to various useful purposes.—4th November, 6 months.

To Thomas Bramley, Gentleman, and Robert Parker, Lieutenant in the Royal Navy, both of Mousley Priory, in the county of Surrey, for their having invented certain improvements on loco-motive and other carriages, or machines applicable to rail and other roads, which improvements, or part, or parts thereof, are also applicable to moving bodies on water and working other machinery.—4th November, 6 months.

To Alexander Bell, of Chapel Place, in the borough of Southwark, engineer, for his having found out or invented certain improvements in machinery for removing wool or hairs from skins.—4th November, 6 months.

To Augustus Whiting Gillet, of Birmingham, in the county of Warwick, merchant, in consequence of a communication made to him by George Bridgman, a Foreigner residing in New Haven, Connecticutt, in the United States of North America, for a certain invention of an improvement in the construction and application of wheels to carriages of pleasure, or of burden, or to machines for moving heavy bodies.—4th November, 2 months.

To George Givinett Bompas, of Fishponds, near Bristol, Esq. M. D. for his having invented an improved method of preserving copper and other metals from corrosion or oxydation.—4th Nov. 6 months.

To Joseph Gibbs, of Crayford, in the county of Kent, Esq. for his invention of improvements in evaporating fluids applicable to various purposes.—6th November, 6 months.

To John Hall the younger, of Dartford, in the county of Kent, engineer, in consequence of a communication from a Foreigner residing abroad, for a machine upon a

new and improved construction, for the manufacture of paper,—9th November, 6 months.

To George Minter, of Princess Street, Soho, in the county of Middlesex, upholsterer, cabinet, and chair manufacturer, for his having invented an improvement in the construction of or making or manufacturing of chairs, which he intends to denominate Minter's reclining chair. —9th November, 2 months.

To Henry Pratt, of Bilson, in the county of Stafford, miller, for his having invented certain improvements in the making and manufacturing of quarries, applicable to kilns, for drying wheat, malt and other grain, and to various other purposes.—11th November, 6 months.

To Sir Thomas Cochrane, Knight, commonly called Lord Cochrane, of Regent Street, in the county of Middlesex, for his having invented an improved rotary engine to be impelled by steam, and which may be also rendered applicable to other purposes.—11th November, 6 months.

To Charles Stuart Cochrane, of Great George Street, in the city of Westminster, Esq. in consequence of a communication made to him by a certain Foreigner residing abroad, for certain improvements in the preparing and spinning of cashmere wool.—13th Nov. 6 months.

To John Tyrrell, of Saint Leonard's, in the county Devon, Esq. barrister at law, for his having invented a method and apparatus, for setting sums for the purpose of teaching some of the rules of arithmetic.—13th Nov. 6 months.

To Thomas Sands, of Liverpool, merchant, in consequence of a communication made to him by a certain Foreigner residing abroad, for an invention of certain improvements in spinning machines.—18th Nov. 6 months.

CELESTIAL PHENOMENA, FOR DECEMBER, 1830.

D.	H.	M.	S.	
1	0	0	0	☉ before the Clock 10 *m.* 49 Sec.
5	7	0	0	☾ in conj. with α in Leo
5	19	0	0	☾ in conj. with ρ in Leo
5	0	0	0	☉ before the Clock 9 *m.* 14 Sec.
6	15	16	0	☾ in □ last quarter
6	19	0	0	☾ in conj. with σ in Leo
7	10	0	0	☾ in conj. with β in Virgo
8	2	0	0	☾ in conj. with η in Virgo
8	13	0	0	☾ in conj. with 1 γ in Virgo
9	0	0	0	☿ in conj. with β in Oph
10	0	0	0	☉ before the Clock 7 *m.* 3 Sec.
12	0	0	0	♄ Stationary
12	8	0	0	☾ in conj. with γ in Libra
12	19	0	0	☾ in conj. with ψ in Libra
13	11	0	0	☾ in conj. with φ in Oph
14	20	19	0	Eclip. conj. or ● new moon
16	17	0	0	☾ in conj. with *d* in Sagitt
17	22	0	0	☿ in conj. with λ in Sagitt
20	0	0	0	☉ before the Clock 2 *m* 13 Sec.
20	21	0	0	☽ in conj. with λ in Aquarius
21	7	0	0	☽ in conj. with φ in Aquarius
21	19	0	0	☿ in conj. with σ in Sagitt
21	19	8	0	☉ enters Capricornus
22	10	42	0	☽ in □ first quarter
24	2	0	0	☽ in conj. with χ in Pisces
24	14	0	0	☿ in conj. with ψ in Sagitt
25	0	0	0	Clock before the ☉ 17 Sec.
25	5	0	0	☽ in conj. with μ in Ceti
26	0	0	0	☽ in conj. with f in Taurus
26	17	0	0	☽ in conj. with ν in Taurus
26	20	0	0	☽ in conj. with 1 δ in Taurus
26	21	0	0	☽ in conj. with 2 δ in Taurus
27	2	0	0	☽ in conj with α in Taurus
28	21	0	0	☽ in conj. with γ in Gemini
29	2	0	0	♂ in conj. with ξ in Pisces
30	0	0	0	Clock before the ☉ 2 *m.* 44 Sec.

The waxing moon ☽.—the waning moon ☾

METEOROLOGICAL JOURNAL, FOR OCTOBER AND NOV. 1830.

1830.	Therom.		Barometer.		Rain in inches.	1830.	Thermo.		Barometer.		Rain in inches.
	Hig.	Low	High.	Low.			Hig.	Low	Hig.	Low.	
OCT.											
26	51	41	30,20	29,89	,3	11	48	42	29,56	29,50	,725
27	51	29	30,36	30,14		12	47	35	29,96	29,89	
28	61	34	29,89	29,83	,125	13	50	30	29,81	29,64	,025
29	54	41	29,69	29,64	,1	14	56	40	29,64	29,58	,05
30	46	32	29,99	29,93		15	52	36	29,60	29,50	,25
31	62	34	29,94	29,85	,025	16	55	44	29,33	29,08	
NOV.											
1	59	46	30,05	30,03		17	48	32	29,55	29,40	,475
2	59	43	30,05	30,01		18	44	28	29,84	29,66	
3	57	47	29,89	29,74		19	40	27	30,12	30,09	,05
4	54	43	29,80	29,74	,1	20	47	25	29,96	29,86	
5	55	38	29,86	29,66		21	52	35	29,86	stat.	,125
6	60	47	29,66	29,20	,025	22	48	41	29,01	29,73	,075
7	51	46	29,33	29,11	,825	23	47	35	30,16	30,04	,05
8	48	32	29,74	29,56	,125	24	40	25	30,33	30,30	
9	46	26	29,83	29,79		25	38	24	30,30	30,26	
10	54	34	29,75	29,59							

Edmonton. *Charles Henry Adams*

Robinson's Machinery for Heckling Flax &c.

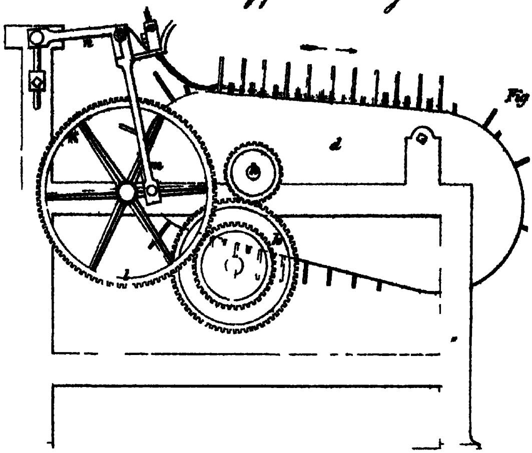


Fig 1

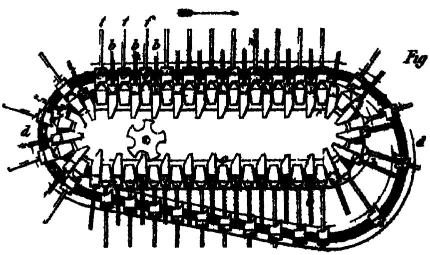
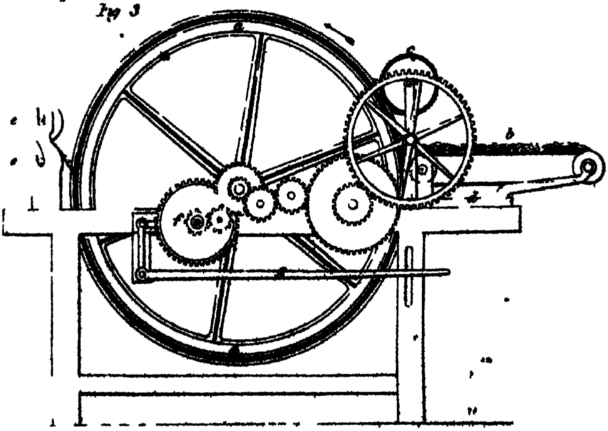
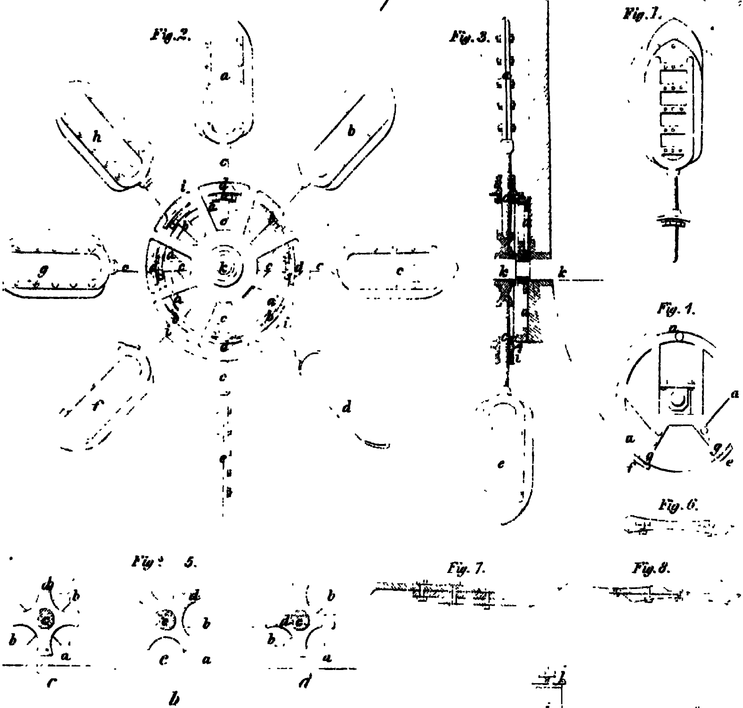


Fig 2

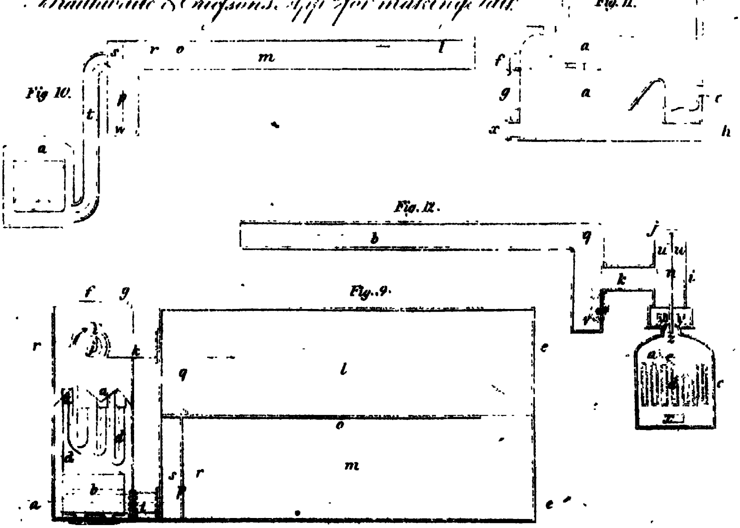
Fig 3



C. H. Williams's Impd. Paddles



Braithwaite & Ericsson's Appts for making Salt



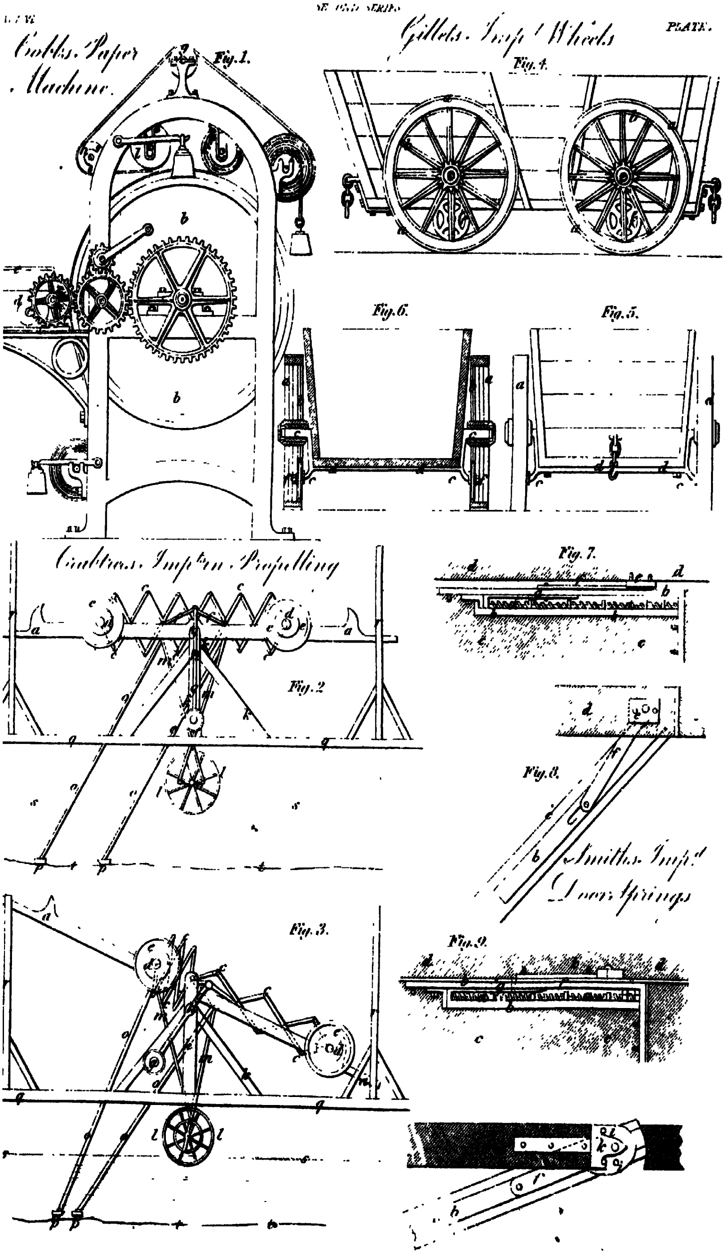
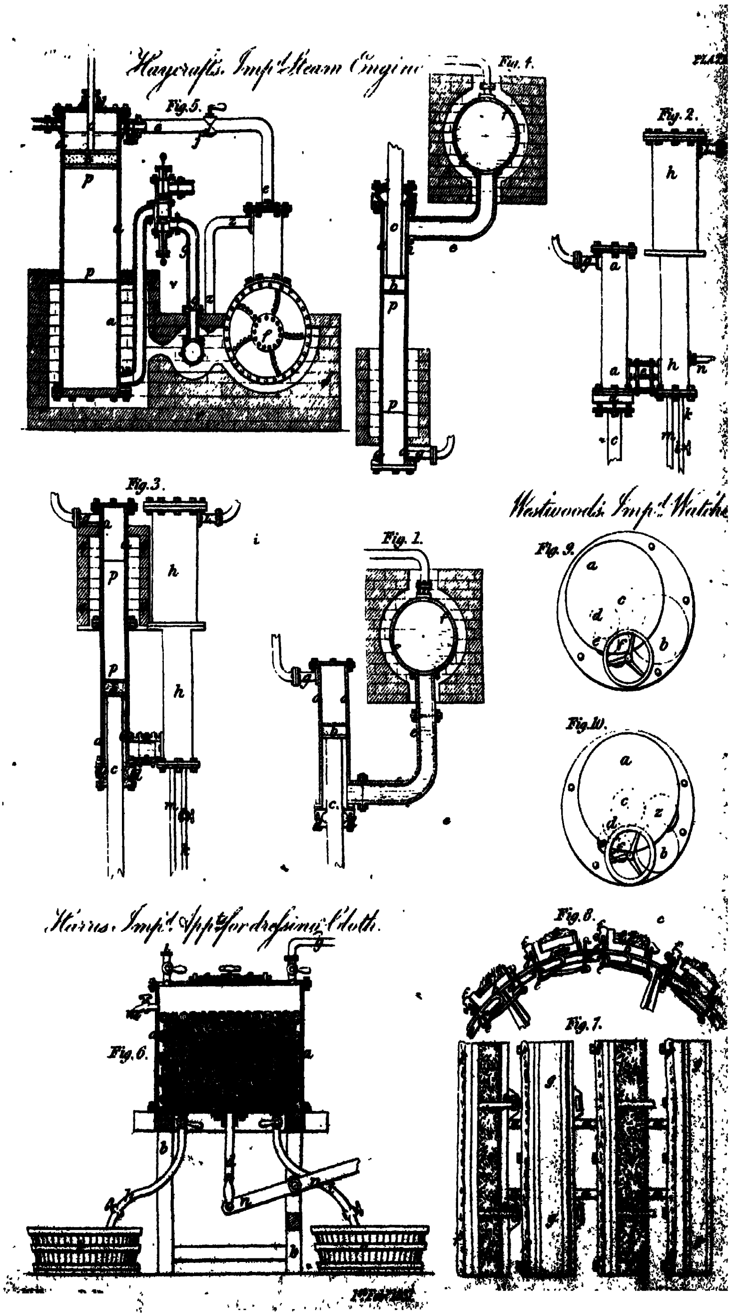


PLATE.
Cobbs. Paper Machine.
Fig. 1.
Gillets. Imp^d Wheels
Fig. 4.
Fig. 6.
Fig. 5.
Crabtrees. Imp^t in Propelling
Fig. 2
Fig. 7.
Fig. 8.
Smiths. Imp^d Door Springs
Fig. 3.
Fig. 9.


Haycrafts. Impd Steam Engine
Fig. 4.
Fig. 5.
Fig. 2.
Fig. 3.
Fig. 1.
Westwoods Impd Watches
Fig. 9.
Fig. 10.
Harris. Impd Appts for dressing Cloth.
Fig. 8.
Fig. 6.
Fig. 7.

THE

London

JOURNAL OF ARTS AND SCIENCES.

No. XXXV.

[SECOND SERIES.]

Recent Patents.

To ORLANDO HARRIS WILLIAMS, *of North Nibley, in the county of Gloucester, Esq. for his invention of certain improvements in the paddles and machinery for propelling ships and other vessels on water.*—[Sealed, 7th January, 1829.]

THESE improvements in the paddles and machinery for propelling ships and other vessels on water, have for their object, first, a method of constructing and enlarging the propelling surfaces, for the purpose of accommodating them to the draft of the vessel. Secondly, saving that sacrifice of power which is expended in working the ordinary paddle wheels, at the points of entering and leaving the water. Thirdly, the capability of obtaining a more effective and direct stroke of the paddle, with the smallest amount of lateral resistance in every part of its rotatory progress.

These objects are effected by the peculiar construction of radial paddles, exhibited in the accompanying drawings; the particulars of which will be fully understood by the following explanation thereof:—

Fig. 1, Plate X, represents one of the paddles or propelling arms, any convenient number of which arms and paddles are intended to be mounted in radial positions in a paddle or carrying wheel, in the manner shown in fig. 2, or they may be placed in any other way suited to propelling vessels on water.

Fig. 3, is a section taken vertically through the carrier wheel and guide ring, shewing the positions of the paddle arms and paddles; the same letters referring to similar parts in all the figures.

I make the paddles of metal or wood, or of any other suitable substance, by attaching two plates, sheets or boards together, by means of bolts and screws, the bolts passing through the stretchers or forked parts of the paddle arms.

In fig. 1, it will be seen, that the paddle consists of two wooden boards bolted together; and in order to increase the length of the paddle, one of the boards is made to shift, so that it may be slidden upward or downward, and the surface elongated to any required dimensions, by passing the bolts through other holes, and then screwing up the nuts tight; when the paddles are constructed of metal, which, in general, I should prefer, I make them of plates or sheets of iron or other metal, bent or cast into the form shewn in the section, fig. 6, that is slightly concave in the middle of their outer surfaces, and bevelled on their edges to a thin feather or angular edge. These plates may be connected together by bolts passed through the forked stretchers of the paddle arms, and may be elongated when required, in the same way as the wooden paddle boards above described; or, if found requisite, I can, in like manner, enlarge the breadth of the paddles, by shifting the boards, plates or sheets, in lateral directions; the modes of doing which are shewn in the sectional figures, 7 and 8. Having described the

modes of enlarging the propelling surfaces, I now proceed to explain the manner in which I avoid the perpendicular resistance the ordinary paddles are subject to, in entering and leaving the water. This object is effected by what may be called feathering the oar or paddle, that is causing it to enter the water edgewise, and then to turn so as to present its broad surface to the resistance of the water, for the purpose of giving the propelling stroke. In fig. 2, there is a series of paddles, *a, b, c, d, e, f, g, h*, shown, mounted on turning or moveable arms; *c, c, c*, c, &c. placed in radial positions, in a paddle wheel or circular carrier; *i, i, i*, which is affixed to the main rotatory shaft *k*, connected to the engine or other first mover; behind this paddle or carrier wheel, there is a circular guide surface or stationary ring *a, a, a*, fixed to the vessel, which is shewn detached at fig. 4. Against this circular ring or surface, the guides *b, b, b, b, b, b*, which keep the paddles in their proper positions during their rotatory course, are intended to slide: fig. 5, shews portions of the edge of the guide ring *a, a, a*, upon which the guides *b, b, b*, are intended to slide.

These guides are fixed on the arms *c, c, c*, of the paddles, by keys or otherwise, as shown in the drawings; they may be made as crosses, in the way represented, or squares, or of any other shape, provided the guide of each paddle has four surfaces at right angles to each other, capable of sliding upon the face of the ring *a*, as the paddle or carrier wheel traverses round, which guides are for the purpose of preventing the paddle arm from turning, and consequently keeping the paddle fixed in its position as it passes round with the carrier wheel; upon each of the paddle arms *c, c, c*, there is also affixed a cross-armed wiper or tappet *d, d, d*, which, when it comes in contact with a stationary projecting piece or cam *b*, (shewn affixed to the side of the guide ring) turns the paddle arm one quarter of a rotation.

This operation will be rendered perfectly evident, by reference to the three positions of the guide, the tappet and the paddle,

(the latter of which is shewn by dots) in the edge views of the guide ring, fig. 5, supposing the paddle to be proceeding edgewise, which it does on entering the water ; the guide *b*, sliding against the surface of the ring *a*, the tappet and paddle would then assume the position shewn at *a*, in figures 2 and 5.

As the paddle proceeds further in its circular course, the tappet comes in contact with the projecting piece or cam *e*, which turns it over as at *b*, in figures 2 and 5, and having passed the projecting piece or cam, another part of the guide comes into contact with the surface of the guide ring, and the paddle then presents its broad face to the resistance of the water as at *c*, fig. 2 and 5, which is the propelling position. It may be necessary to remark, that there are small holes or recesses ; *g*, *g*, in the guide ring behind the projecting pieces or cams, as seen in fig. 4, and shewn by dots in fig. 5, for the purpose of allowing the angles or projecting parts of the guides to sink into the ring at those points where the paddle arm turns over one quarter of a rotation. The paddle having performed its full stroke, which I recommend to be in the space of about 55 degrees of the entire rotation of the carrier wheel, the tappet comes into contact with another projecting piece or cam *f*, (see fig. 4,) and the paddle is again turned one quarter round, so that it passes out of the water edgewise, as it entered it.

The situation of these cams or projecting and stationery pieces *e*, and *f*, determine the points at which the paddles shall be turned, from the edgewise positions in which they respectively enter the water, to that of presenting their broad surfaces against the water for giving the propelling strokes, and of again turning and passing out of the water edgewise. I do not, therefore, confine myself to placing the projecting pieces or cams in the precise situations shewn in the drawings, though I believe those situations to be best for the general performance of the paddles or propellers. In the drawings above referred to, I have supposed the wheels to which my improved paddles are attached, as acting perpendicularly on the sides of a vessel, and

impelled by steam or any other power; it is not, however, necessary to limit them to any particular situation, as they may be applied at the head or the stern of a vessel, or even in the interior, working through the sides or bottom, provided the vessel was constructed in a proper way to allow of their working effectually in those situations. Under a suitable arrangement, these improved paddles might also be made to propel vessels, by acting against the air or wind, by being mounted on a carrier wheel, placed horizontally or otherwise, and driven round by any adequate power, as by manual labour of the crew of the vessel, or any other means, in which situations the paddles in succession, might be brought to act and bear against the air or wind, and by that means propel the vessel forward.

If under any circumstances, as to the want of fuel or other cause, it should be necessary to suspend the operations of the paddle wheels, and to employ the sails only, it will be desirable to bring the lower paddle, which is immersed in the water, to an edgewise position, in order that it may not impede the course of the vessel, and that its feather edge may cut its way through the water. This may be done, by twining the upper paddle arm, which stands perpendicularly, from its position one quarter round, and then twining the paddle wheel until this paddle arm has passed over the first projecting piece or cam, and when the paddle arrives at the lower part of the wheel, it will have been brought edgewise, and not into the propelling position, as above described, but in a position to cut the water. A plug, as at *h*, fig. 4, is inserted into a hole at the upper part of the guide ring, which, on being removed, allows the arm to be turned round, for the above described purpose.

In order to repair any accidental fracture in any of the paddles, I propose to connect them to the arms by sockets and bolts, so that any one may be readily removed, and another paddle mounted in its place.

The same contrivance of a turning paddle, may also be adopted with great advantage to the floats of tide wheels and

other under-shot water wheels, for the purpose of escaping the back water; but as the construction of such wheels must vary according to circumstances, I do not think it necessary to exhibit in the drawing, any method of applying the improved paddle or float thereto, as my invention consists in the contrivance for turning the arm of the paddle or float in the manner above described.

In describing these my improvements in the paddles and machinery for propelling ships and other vessels on water, and in under-shot water wheels, I have necessarily exhibited many parts which are not new in their application; I therefore wish it to be understood that my improvements consist in these two particulars; first, the described method of constructing and increasing the surfaces of the paddles, or propellers, or floats; and, secondly, the mode of guiding and turning the paddles or floats, by means of the peculiarly constructed guides and tappets fixed on the arms, and the peculiarly constructed guide ring and projecting pieces or cams, for directing their action, which are fully set out in the drawings hereunto annexed, and described as above.—[*Inrolled at the Rolls Chapel Office, July,* 1829.]

Specification drawn by Mr. Newton.

To ROBERT CRABTREE, *of Halesworth, in the county of Suffolk, gentleman, for his invention of a machine or apparatus for propelling carriages, vessels, and locomotive bodies.*—[Sealed 4th July, 1829.]

THIS invention is a mode of propelling locomotive bodies by means of legs which project out behind, their ends bearing on the ground, are acted upon by machinery, and cause the body to run forward; we give the specification in the words of the Patentee, "The invention consists in

a machine apparatus, or arrangement of mechanism, which is put in motion by means of a pendulum or lever acting upon two lever chains, or systems of levers, commonly called Lazy Tongs, which, by their alternate, expansive and contractive motion in propelling weights to and fro upon a main beam, balance or lever, act by means of crank rods upon the cranks of paddle wheels in relation to vessels, and upon common wheels in relation to carriages, and upon toothed wheels, drums, straps or bands in relation to fixed machinery; and also by means of propellers in relation both to vessels and carriages, thereby producing progressive motion. And in further compliance with the said proviso, I, the said Robert Crabtree, do hereby describe the manner in which my said invention is to be performed, by explaining one of its applications, namely, that which serves for propelling vessels, and for which description it will be necessary to refer to the drawings annexed hereto, and to the letters marked thereon (that is to say),

Description of the Drawings.

"Plate XI fig. 2, represents a side elevation of such an application as aforesaid of my said invention, in a quiescent state; *a, a,* is the main lever, composed of two parallel boards or planks, leaving an interval between them for the lever chains to traverse backwards and forwards; *c, c,* are two lever chains, working between the two sides of the main lever. They are confined at one of their ends in the centre of the main balance lever, by a bolt passing through the main lever, and are supported at the other ends by the axles of wheels or rollers, marked *d, d,* shown by dots; to which wheels or rollers, by their alternate contraction and expansion, they give a motion to and from the centre, from and to the extremities of the

main beam balance or lever. These wheels or rollers *d, d,* move between two weights of iron, lead or other ponderous materials, marked *e, e,* in the form of desks or any other convenient shape, which are fixed on the ends of the axes of the rollers, and by their motion to and fro, depress and elevate the main balance or lever alternately, as shown in the drawing, fig. 3; *f,* represents an iron or other bar or rod, fixed at each end to a bolt or pivot of the lever chains, and by its alternate action produced by the oscillations of the pendulum or lever *g,* next hereafter described, expands and contracts them; *g, g,* is a lever or pendulum, working on the bolt *h,* fixed in the upright frame *k,* the upper end of the short arm of which lever is connected by a bolt or pivot, with two iron or other bars *i, i,* the other ends of which bars communicate in like manner with the bolt at each end of the bar or rod *f,* and by its motion expands and contracts the lever chain; *k, k,* is a stand or frame, supporting the machinery; *l,* is a paddle wheel, which is put in motion by the two crank rods *m, m,* which communicate at their upper ends with the main lever, and at the lower end are attached to a double crank *n,* upon the axis of the paddle wheel; *o, o,* are legs or propellers, working at their upper ends upon bolts on the main lever, and which may be used in canals, where the depth of the water is nearly uniform; *p, p,* are feet, in which the lower ends of the propellers work upon bolts or pins; *q, q,* represent the desk of the vessel; *r, r,* are frames at each end of the machinery, each composed of a double upright, with braces, and their use is to guide and keep steady the main lever, the extremities of which work between them; *s, s,* is the water line; and *t, t,* the bottom of the canal or river.

"The aforesaid drawings and description apply more directly to the action of the machine, in propelling vessels

and other floating bodies; but it is obvious that the same mode of operation equally applies to the propelling of carriages and other locomotive bodies upon land; for which purpose nothing more is necessary than to apply the cranks to the axis of carriage wheels, instead of the paddle wheels, or to propel them by the action of the main lever on the propellers *o, o.* And, lastly, I do hereby declare, that the drawings hereinbefore described, is intended to represent my said invention, as calculated to be moved by manual labour; but that I claim and reserve to myself the liberty of using any of the known mechanical and moving powers for the purpose of putting the said machine or apparatus in motion."—[*Inrolled at the Rolls Chapel Office, January,* 1830.]

To JOHN BRAITHWAITE *and* JOHN ERICSSON, *of the New Road, in the county of Middlesex, Engineers, for their invention of an improved method of manufacturing salt.*—[Sealed 27th February, 1830.]

WE give the description of the invention in the words of the Patentees.

"We, the said John Braithwaite and John Ericsson, do hereby describe the nature of our said invention to consist in heating brine, from which salt of any required quality is to be manufactured in a close boiler, to any degree of temperature above that necessary to produce the same quality of crystallization by the ordinary method; and also, while the said brine is under pressure, in such manner as to prevent crystallization or precipitation of salt in the boiler in which it is so heated, and thence running into large open shallow vats or vessels, which we

call evaporators, elevated above the boiler, and not acted upon by the fire, where the aqueous particles being allowed to evaporate, and the brine becoming of a lower temperature than that in the boiler, the salt crystallizes, and precipitates to the bottom of the vat, by which improved method of manufacturing salt, we prevent the formation of what is usually called pan scratch or pan crust, and effect an important saving in fuel; and, in further compliance with the said proviso, we the said John Braithwaite and John Ericsson, do hereby describe the manner in which our said invention is to be performed, by the following description thereof, reference being had to the drawing annexed, and to the figures and letters marked thereon (that is to say):

Description of the Drawing.

" Plate X. fig. 9, is a plan of our said invention; *a*, is a boiler, with parts represented as broken away, the better to show its interior arrangement; *b*, represents the fire bars; *c*, *c*, the furnace door; *d, d, d, d,* is the flue, with cleansing doors, as at *c*, through which to clean it out; *f*, is a man hole; *g*, is the end of the flue, which goes into the chimney; *h*, is a supple pipe, to feed the boiler with cold brine; *i*, is a cylinder, fitted on to the top of the boiler, for purposes hereinafter described; *j*, is a driving pulley, to turn a shaft or spindle working within the cylinder, to be also hereinafter explained; *r*, is a conduit pipe, through which the heated brine from the boiler, after having been brought into a cylinder, *i*, runs into *l*, *m*, which is a large shallow vat or vessel, called by us an evaporator, with a longitudinal division at *o*, and a transverse one at *p*, the use of which divisions will hereinafter be more particularly explained; *q*, *r*, and *s*, are float boards to limit the evaporating surface of the brine in the

evaporator; *t*, is a pipe serving to connect the evaporator with the boiler, and leading from the evaporator to the bottom of the boiler.

" Fig. 10, is a section of the pipe, as also of the boiler and of the side *m*, of the evaporator, supposed to be taken from *a*, to *e*, of fig. 9, showing the course the brine is compelled to take under the transverse division *p*; the object of this division, and the well *w*, is to prevent the salt, which is forming in the evaporator, to be carried into the boiler.

" Fig. 11, is an end view of the boiler and evaporator, and as the same letters are used to denote similar parts in all the figures, it will only be necessary to state that *x*, is a second man hole in the boiler; then refer to the explanation of the other figures, to explain the parts in this figure, which are similarly lettered.

" Fig. 12, is a section of the boiler, the cylinders *i*, the pipe *k*, and the side *l*, of the evaporator, supposed to be taken from *e*, to *r*, of fig. 9, and it will be seen that this side of the evaporator is also provided with a well *v*, but without any transverse division; *n*, is a spindle, to be driven round by the pulley *j*, carrying on its lower end the vanes or fans *y*, *y*, *y*, *y*, and supported on the step *z*; this step is fixed to a bar that stands across the aperture in the top of the boiler, which aperture communicates with the cylinder *i*, above it; *u*, *u*, is a float board, to prevent as much as possible, any evaporation taking place, except in the evaporation.

" The mode of operating with the apparatus hereinbefore described, is as follows:—

" The apparatus being filled with brine, as shown in the figures, and a fire being lighted in the furnace, the column of brine in the cylinder *i*, will keep the brine in the boiler constantly under pressure, and thus it may be always

heated to any temperature higher than that in the evaporator, while the boiler being completely filled, no evaporation can take place therein, and consequently no salt will be formed there, to become pan scratch or pan crust. When the brine in the boiler begins to heat, the fans *y*, *y*, *y*, *y*, must be turned by means of the pulley *j*, and a driving-strap, when a portion of brine will be displaced, which will pass through the pipe *k*, into the evaporator, and the quantity so displaced, being replaced by a portion out of the boiler, a corresponding portion will flow from the evaporator into the boiler, through the pipe *i*, and thus a constant circulation of brine will be kept up, which, as soon as it flows beyond the float-board *q*, where the evaporation first takes place, will begin to deposit salt, which may be raked up in the ordinary way; as the quantity of brine on the apparatus diminishes, cold brine is to be admitted to the boiler, through the feed-pipe *h*, and it is only necessary further to observe, that the temperature required for the particular quality of the salt to be produced, must be regulated by the extent of the evaporating surface exposed in the vat or evaporator.

"Now, whereas other formed boilers and evaporators may be used, and the contrivance for raising the brine from the boiler may be a pump or other known engine, but whereas we claim as our invention the manufacturing of those qualities of salt, the variety of which depends upon the temperature at which the crystal is found, by heating brine in a close boiler under pressure, to a degree of heat above that which would be required to form the same quantity of salt by the ordinary method, and then causing such brine, so heated aforesaid, to pass from a close boiler into an open vessel, for the purposes of evaporation, at a distance from, and not acted upon by the fire, where the required temperature is obtained, and

thence, when too much cooled, to deposit salt of the quality required, to return into the boiler, to be again heated to its former temperature, and again passed into the open vessel, thus keeping up a constant circulation of brine through the close boiler and open vessel, and a consequent constant deposit of salt.

To THOMAS COBB, *of Calthorpe House, near Banbury, in the county of Oxford, Esq. for his invention of certain improvements in the manufacture of paper, intended to be applied to the covering of walls or the hanging of rooms, and in the apparatus for effecting the same.*—[Sealed 15th September, 1829.]

THE invention for which this Patent is granted, is a mode of producing an embossed surface of papers intended for covering walls of rooms, by which a beautiful effect can be produced on papers, which are coloured in the pulp, and not stained after the paper is made, as is usual with paper hangings; and by which also silks, velvets or other coloured goods can be put upon the surface of paper, and when embossed, will produce a rich and beautiful appearance.

SPECIFICATION.

"My improvements in the manufacture of paper, intended to be applied to the covering of walls or hanging of rooms, and in the apparatus for effecting the same, consists, first, in manufacturing tinted or coloured paper intended to be applied to the covering walls or hanging rooms, by impressing them with patterns during the operation of making; secondly, embossing paper with patterns for the same purpose, after the paper is made, and which, by the pressure it receives during this operation, is made to resemble plain damask or figured silks; thirdly, in uniting two or more thicknesses of paper together for the same purpose, previously to their receiving the

embossing, one of which may be coloured paper, and the other white; fourthly, in uniting for the same purpose, paper with silks, velvets, and other fabrics, so that, if plain, they may receive an impression or pattern by embossing, and may also be struck on walls with the same facility, as paper only is commonly done; and, fifthly, in the apparatus for uniting the papers or paper, and other fabrics, as above mentioned. First, in some cases, I make a coloured or tinted paper, and in doing this, I dye or stain the rag or pulp by any of the known methods of dyeing or staining them, and make it into paper in the usual way; and during the process of manufacture, and before it is dry, I cause it to pass between rollers, and receive an impression therefrom, one or both of which rollers are engraved, stamped or impressed, or covered with something that will give the pattern or figure required, by which operation it is impressed and receives a pattern or figure, or the same thing or effect may be obtained by using plates or other flat substances, in or on which the required pattern or figure is formed, by laying them on the paper in its way to the pressing rollers, so that in passing through them, it receives the figure or impression.

" Secondly, in other instances, and particularly where I want a shining article to resemble silk, I make my paper as before described, by any of the known methods, and when dry, I pass it through rollers, one or both of which are engraved with the pattern required, and at least one of them heated, so that the impression obtained may be stronger and more shining; and it is not necessary the paper for this purpose should be always coloured or tinted in the rag or pulp during the process of manufacture, but either coloured paper so made, or paper which has been made white, and afterwards coloured by any of the known methods, will do equally well for this purpose; neither is it necessary the paper should be made in long lengths, although I prefer it so, and it may either be made so by machinery, or a number of sheets may be joined together, or sheets may be impressed by either the heated rollers or plates passed through

heated rollers, and united in putting them on the walls so as to form the pattern intended when combined. In some cases, I give part of the impression during the operation of making the paper, by which it is twilled or lined, ribbed or striped, by passing it through rollers prepared according to the purpose intended, which causes it to appear thicker than if pressed flat and smooth, and prepares it to receive a stronger impression; and I afterwards, when nearly or quite dry, pass it through other rollers, one or both of which are heated, and on which are other patterns, so that part may be shining and other parts not so; and whenever it is particularly desirable that the paper should retain its shining quality in a greater degree, I size it strongly with animal or vegetable substances, and sometimes use gums or wax therein.

"Thirdly, I contrive to unite two or more thicknesses of paper together, either during the process of making, or afterwards, by introducing between them any of the glutinous substances or articles calculated for the purpose, and one of these papers may be of any colour required for the outside, and the other may be coloured or white for the back, and may also be of a coarser and stronger description than that which is intended for the outside: and when these papers are so united, they are passed through the pattern and heated rollers, or pressed with the plates as before described, to give the pattern required, and in general I prefer these double or compound papers to those which are of one sheet or thickness, only as they take the impression and preserve the patterns better, and are less injured by the operation of pasting, in putting them upon the walls.

"Fourthly, instead of the double paper before described, I take plain or figured silks, satins, velvets, cottons, linens, or other fabrics for the one side, and unite these with paper by introducing any of the glutinous substances or articles calculated for the purpose between them, in the way before described when two or more thicknesses of paper are used; and when so united, if the article is plain and wanted to be figured, I emboss

it with any pattern required, in the manner before described, and by ribbing or twilling it, by passing it through rollers prepared to give it this appearance after it is united with the paper, I give an inferior silk the appearance of a much more valuable one, and allow of the paper thus united being pasted and stuck on walls in the same manner, and with as great facility as though it were paper only.

" In either of the cases before mentioned, I produce the embossing effect by means of a swing press, where the figure or pattern occurs but seldom, to the screw of which press a plate with the intended pattern is attached, having a chamber above it to receive a heater, for the purpose of making the impression stronger and more lasting. With this and the other modes of embossing, I sometimes use leaf gold, or other metallic substances, so that the whole or part of the impression may be covered thereby (as in the binding of books), and in some cases I take paper which is already covered with gold, silver, or other metallic substances, and emboss and cut out the figure intended, so as to fit the impression made in embossing. In other cases, and particularly when plain silk are united with paper, I produce a pattern or effect called watering, by pressing two thicknesses or pieces together between heated rollers, or in a press face to face, so that during the operation of pressing, one may bruise the other, and produce the effect described.

" Fifthly, the apparatus for uniting the different thicknesses of paper, or uniting the paper with any other articles, may be constructed in the manner represented in the drawing annexed; *a*, shews the roller on which the paper is wound for the back of the united article, and which is weighed to prevent its running too fast and to keep the paper smooth; *b*, a large drum or cylinder covered with woollen cloth; *c*, a cylindrical brush or roller covered with woollen cloth or plush, which with the ductor roller *d*, attached to it, works at a greater speed than the drum in a box *e*, containing the paste or other glutinous mixture.

The brush and the drum are connected together by spur wheels, and to the shaft of one of them a winch and handle is attached, so that when turned by the workmen the revolving motion of the the large drum draws the paper from the roller *a*, (see fig. 1, Plate XI), which is pasted in its progress upwards by the revolving brush roller *c*; *f*, is another roller, on which the silk, paper, or other material intended to form the face or outside of the united article is wound round in the same way, as the paper for the back, and this roller *f*, is also weighted to keep the material tight in its progress over the guide rollers *g*, and *h*, one of which is a screw roller reversed in the centre, to keep the article stretched in width on its arrival at the pressing roller *i*, and this being weighted also, according to circumstances, gives the necessary pressure to the two materials about to be united, and causes them to stick together. When this operation has been effected, the united materials are rolled upon the roller *k*, which, as well as the pressing roller *i*, is moved by their peripheries bearing on the large drum, which being moved as before stated, by the workmen turning the handle or winch, the whole is put in motion, and the proeess of pasting and uniting proceeds, and whenever the articles united are of a description so as not to bear rolling up on the roller *k*, they are suffered to fall into the basket *l*; or without the last described apparatus, the pasting may be effected by any other convenient means.

"The patterns intended to be employed for the above purpose, admit of all the varieties of engraving and impressing, which can be used for embossing, in the manner before described, and they may be made to appear as though they were woven in the material, or embroidered or embossed thereon, according to the article which it is intended to resemble, the intention being to make paper appear like silks, cloths, &c. of greater value than itself, and to have a similar effect in improving the appearance of silks or whatever articles are united or combined with the paper; and the novelty of my invention consists in giving the improved appearance, in the manner herein

described, to papers intended to be applied to the purposes of covering walls or hanging rooms, as above stated; I do not claim any thing new in the process of making paper, further than what is described under the first head, viz. the method in which the figure or impression is given during the manufacture of the paper for this particular purpose; and though embossing has been used for various other purposes, yet I claim it as new, when applied to papers prepared in the manner described, or when united with other fabrics for the purpose of covering walls or hanging of rooms, as above said."— [*Inrolled at the Rolls Chapel Office, March*, 1830.]

Specification drawn by Mr. W. Newton.

To GEORGE DANIEL HARRIS, *of Field Place, near Stroud, in the county of Gloucester, Clothier, for his invention of certain improvements in dressing and preparing woollen yarn, and in the cleansing, dressing, and finishing woollen cloths and other fabrics, and in the apparatus for performing the same.*—[Sealed the 15th January, 1828.]

THE retension of grease and soap in the fibres of the wool, and in many instances during the process of manufacture its becoming baked and hardened, renders the cloth incapable of receiving dye so effectually as it should do, the consequence of which is, that cloths, particularly those of fine quality, when but slightly worn, become white on the edges. This defect the Patentee is endeavouring to prevent, by cleansing his yarns from grease more effectually than has heretofore been done, and of preventing the soap employed in the fulling process from entering into the fibres of the wool. It is likewise his objects, by the employment of certain elastic materials in

connection with teasles in the gig mill, to lay the pile or nap of the cloth more smoothly, and produce a more permanent lustre than has hitherto been effected by any other means.

We have much pleasure in stating of our own knowledge, that both objects have been achieved in an eminent degree by the means herein proposed, and that the cloths so treated not only look better, but wear better than any cloths which we have seen of a similar quality. The following is the

SPECIFICATION.

These improvements in dressing and preparing woollen yarns, and in cleansing, dressing and finishing woollen cloths and other fabrics, and in the apparatus for performing the same, consists of the following particulars:—

"1st. In dressing and preparing woollen yarns, I adopt a process by which, in a great measure, the grease in the wool is destroyed, and the curl of the yarn subdued and straightened. 2dly. After the cloth has been woven and soaked in an alkaline solution, and then washed in clean water in the ordinary way, I further cleanse it from the alkali, for the purpose of preventing the soap in the fulling process adhering so firmly to the cloth as it does in the common mode of proceeding. 3dly. I *cleanse, dress,* and *finish the cloth,* by the employment of certain materials never before applied to that purpose, in connection with a *gig mill,* or *other rotatory machinery.*

"In dressing and preparing the woollen yarns, I generally take the yarn in cops as it comes from the spinner; and having placed the cops in a close vessel, rendered perfectly air tight, I then put in action an air pump, which had been previously connected to the vessel by a pipe with a stop cock, and having opened the stop cock,

I work the pump, and draw out or exhaust the air from the interior of the vessel, and also the air which was confined between the coils of the woollen yarn, and between the fibres of the wool. The vessel and the yarn being now in a state of vacuum or exhaustion, I let into it a quantity of alkaline liquor through a pipe with a stop-cock, which liquor immediately insinuates itself into the pores of the woollen yarn, and destroys the grease contained therein.

"For the sake of illustrating my mode of performing the above described process, I have represented in the accompanying drawings (see Plate XII, fig. 6), a section of an apparatus, which I find to be convenient for the purpose; but I do not mean to confine myself precisely to the form or construction represented, as a close vessel of any other convenient shape would answer the purpose nearly as well; *a*, *a*, is a square vessel made of copper, tinned and united at the joints by screw bolts, passed through flanges. The vessel may however be of any other suitable material, and made in such a manner as workmen may deem best; and it should be placed upon standards *b*, *b*, in order to raise it some distance from the ground; *c*, *c*, is a false bottom mounted upon a perpendicular rod *d*, which is passed through the bottom of the vessel *a*, and slides through a stuffing box, for the purpose of keeping it air-tight; *e*, is the man hole of the vessel, which being opened, allows the cops of woollen yarn *f*, to be placed within the vessel, as shown (each cop having a temporary spindle previously passed through it); *g*, is a pipe leading from the interior of the vessel *a*, at the upper part, to an air pump, placed at any convenient distance; *h*, and *i*, are pipes leading from the bottom of the vessel *a*, to tubs respectively containing solutions of alkali and of acid.

"The yarns having been placed within the vessel *a*, the man hole *e*, must be closed and secured so as to

render it perfectly air-tight; the stop cock of the pipe *g*, being now opened, the air pump is to be set to work, by means of which the air will be drawn from the vessel *a*, and from the fibres of the wool, as above said. When the vacuum within the vessel *a*, is sufficiently perfect, the stop cock of *g*, must be closed, and those of *h*, opened, by which the alkaline liquor in the tub *k*, will be allowed to flow through the pipe *h*, into the vessel *a*, which by that means will be filled up to the top. This alkaline liquor, I make by dissolving a suitable quantity of potash in hot water, say about two and a half ounces of potash in a gallon of water; but I do not confine myself to those proportions, nor to the use of that particular material, as soda will answer nearly the same purpose. This liquor should be heated to about 140 degrees, Fah. more or less, according to the quantity and condition of the wool.

"The vessel *a*, being thus occupied with the hot alkaline liquor, and the yarns perfectly immersed therein, I now close the cocks of the pipe *h*, and open the cock *l*, for the purpose of letting the atmospheric air into the upper part of the vessel; the pressure of which assists the operation, causing the liquor to penetrate more perfectly into the pores of the wool; and this might, if necessary, be further promoted by the employment of an injecting pump, so as to condense a volume of air upon the surface, or by hydraulic pressure. When this hot liquor has acted upon the yarns twenty minutes or longer, according to the quality and condition of the wool, I then open the discharge cock *m*, and let the scum and oily matter, with the upper portion of the liquor, run off; I now open the cocks of the pipe *h*, again, by which means the liquor is enabled to run out of the vessel *a*, into the tub *k*. But in order to express the alkaline liquor from the yarns, I apply the power of a lever *n*, to the end of the perpen-

dicular rod *d*, which, by raising the false bottom *c*, presses the yarns against the top of the vessel *a*, and the liquor thereby expressed, runs down through the pipe *h*, into the tub below. If the grease is not sufficiently removed from the wool, and the curl subdued and straightened by this operation, it may be repeated; and after the alkali has been removed, the yarns may be washed with hot water. Instead of employing the pressing apparatus above described, the yarns may be removed from the vessel and squeezed by any other means.

" After closing the necessary cocks, I again put the air pump in operation, and having exhausted the vessel containing the yarns as before, I now introduce an acid diluted with water, for the purpose of neutralizing the alkali, which is done by opening the stop cocks in the pipe *i*, when the diluted acid passes up from the tub *o*, through the pipe *i*, into the exhausted vessel, and enters the pores of the wool. For this purpose I prefer to use sulphuric acid of about the strength of two ounces of concentrated acid in a gallon of water. This liquor may be then drawn off, and the yarns squeezed and washed in the way above described. The man hole may now be opened, and the yarns removed to be prepared and worked into cloth in the usual way.

" The yarns having been woven into cloth, and cleansed in the ordinary manner, previous to milling I submit the cloth to the action of a *weak* acid, for the purpose of neutralizing what alkali may have been left in it, which operation prevents in a great measure the soap in the fulling process entering into the fibres of the wool, and adhering so firmly to the cloth, as it does in the usual mode of proceeding. This operation may be performed by immersing the cloth in diluted acid in an ordinary open vessel; but I prefer placing the cloth in a close vessel,

and exhausting the air from it, as above described, previously to introducing the diluted acid.

"In *cleansing, dressing,* and *finishing woollen cloths,* and other similar fabrics, I attach to the ordinary gig mill, or other rotatory machine employed for cleansing, raising and dressing, a number of ribs of sponge, for the purpose of uniformly spreading the water on the face of the cloth, and creating a more equal friction against its surface, as the gig barrel revolves, which cleanses and lays the fibres of the wool, and at the same time gives lustre to the dress or finish. I also attach to the gig barrel, fillets of a material made from caoutchouc (Indian rubber.) This caoutchouc having been dissolved by Hancock's patent process, is in its fluid state, impregnated with fine grits, such as emery powder, steel filings, pounded glass, or other hard granulated substances; which material being dried, is then cut into fillets and attached to the gig barrel. The points of the grit protruding through the surface of the Indian rubber form an elastic file, which rubbing against the cloth under operation, as the gig barrel goes round, straightens the pile or nap, and gives a smooth face to the cloth.

"These materials act in a similar way when attached to the gig barrel, either in conjunction with teasles, wires or brushes, or alone, and give a much more beautiful surface and appearance to the cloth, than has heretofore been produced by any other mode of dressing. The sponge may also be employed in a dry state, in conjunction with a brushing machine, or any other apparatus for setting up the pile, or dressing and finishing the cloth, and the fillets of caoutchouc, containing the gritty material, may also be adapted to hand dressing.

"The manner in which I attach these materials to a gig

barrel, or other rotatory apparatus, is shown in the accompanying drawing (see Plate XII, figs. 7 & 8); but I do not mean to confine myself to that particular mode of adapting the materials, as many other modes of mounting or fixing pieces of sponge, and fillets of Indian rubber to a revolving apparatus, may be devised to answer the purpose nearly as well.

"Fig. 7, is a representation of a portion of the periphery of a gig barrel; fig. 8, is an end view of the same, with the above described materials attached thereto. The gig barrel, as usual, is made by circular rings of iron *a*, *a*, attached by means of arms to an axle, upon the periphery of which rings are fixed; the gig boards or plates *b*, *b*, containing the teasles *c*, *c*, as in the common way. By the side, or in any convenient situation contiguous to the gig board, I attach the boxes or frames *d*, *d*, in which I propose to place the ribs of sponge. These boxes or frames I make of plate iron, and mount them upon springs *e*, *e*; in order to afford elasticity, I usually stretch the pieces of sponge over small sticks, to which they may be secured by strings sewed through. These sticks, with the sponge, I place in the frames as shown at *f*, *f*, the backs of the frames being cut into teeth, and the opposite sides of the frame pressed up by screws, in order to make the sponge fast. In this or any other convenient way, the sponge being attached to the gig barrels, and raised a little above the teasle guard, as the gig barrel revolves, the sponges will work against the surface of the cloth, and produce the effect above described. The fillets of Indian rubber made in the manner above described, I propose to attach to the gig barrel, by fixing them on to boards as at *g*, *g*, the sides of the material being held fast upon the boards, by indentation or teeth cut in side plates, which

are turned over, and I fasten these boards *g*, to the gig plates or boards by spring catches, or by any other convenient contrivance.

"From the above description it will appear that the principal object of my invention, and that which I claim under my aforesaid patent, is the above described process of introducing alkali and acid to the wool by the agency of a vacuum; and the new application of sponges and Indian rubber as above described.—[*Inrolled at the Rolls Chapel Office, July,* 1828.]

Specification drawn by Mr. Newton.

To AUGUSTUS WHITING GILLET, *of Birmingham, in the county of Warwick, Merchant, in consequence of a communication made to him by George Bridgman, a Foreigner residing in New Haven, Connecticut in the United States of North America, for a certain invention or improvement in the construction and application of wheels to carriages of pleasure, or of burden, or to machines for moving heavy bodies.*—[Sealed the 4th of November, 1830.]

THE Specification of this invention is described in the following manner:—

SPECIFICATION.

"These improvements in the construction and application of wheels to carriages of pleasure, or of burden, or to machines for moving heavy bodies, consist in the adaptation of what may be called *perpetual railway* to carriages of different kinds, which is formed by a circular rib or rail placed round the interior of the felloe of the wheel, and upon which circular rib a small wheel with a grooved periphery is intended to run, which small wheel bearing its portion of the burthen of the carriage, by running upon a smooth even surface, greatly

facilitates the progress of the carriage when the larger or running wheel passes over heavy or uneven ground.

"Plate XI. fig 4, is a side elevation of a railway carriage or tram waggon, with the improvement adapted thereto. Fig. 5, is a back view of the same; and fig. 6, is a transverse section of the waggon and of the wheels, the similar letters referring to corresponding parts in all the figures; *a, a, a,* is the running wheel of the carriage; *b, b, b,* the circular rib or rail of iron, which is attached to the interior of the felloe of the wheel within the range of the spokes; *c, c,* the main axle tree of the carriage, the extremities of which pass through the boxes and naves of the wheel as usual, and are key'd or otherwise secured at the outer ends, to prevent the wheel from coming off. The only peculiarity in this part is that the interior of the box of the wheel is made something larger than the axle, in order to allow the axles a small degree of play or free action. A bar of iron *d, d,* is passed under the carriage as a strengthener, and from the ends of this bar, there are bent pieces *e, e,* the ends of which form the axles of the small wheels *f, f.* These small wheels may be made with any number of spokes, or they may be solid iron rollers; the only peculiarity is that they must have a flute or groove round their outer rim or periphery, suited to the form of the circular bar or rib *b,* upon which the wheel runs.

"It will now be perceived that though the running wheels *a, a,* pass over the ground as in ordinary carriages, yet the weight of the carriage and its burthen is borne by the small wheels, and consequently, though the large running wheels should pass over soft, heavy, or uneven ground, the wheels which actually bear the weight, and upon which the carriage travels, move upon a smooth, even, perpetual railway, on which there is little or no resistance. This contrivance is equally applicable to the wheels of any kind of carriage, and is only shown in the drawing as adapted to a tram waggon, for the purpose of illustrating its peculiar construction and adaptation. The original inventor further explains his invention in these words:—

" The wheels are or may be constructed in the common form, and of the same materials as of the common cart or carriage wheel, with the exception that one set or class of wheels (for a cart or carriage) are concave on the periphery, and the other set are convex, both on the periphery, and inner circumference of the rims of the wheels; likewise that one set must not be larger than to admit of their moving in their whole diameter, between the axle and inner circle of the rim of the others. It follows of course, that one set of wheels will be more than as large again as the other set for the same vehicle, and likewise that there will be double the number of wheels to a carriage, that would be required in the common method of applying wheels. In the application of the wheels, there are two applied where there is usually one, the smaller one as above mentioned, moving in the inner circumference of the rim of the larger, though in other respects detached from it, and revolving on its own axis, situated either exactly in a perpendicular line under the centre of the axis of the larger wheels, or forward or back of the centre, and are by their axles attached to the body of the carriage or vehicle, and may be secured for permanency by straps to the axles of the larger wheels above them. The rims of the large wheels are made so wide that the rim of the smaller, with the concave in its greatest circumference or periphery, may run clear of the spokes or support of the centre of the larger, and on its inner convex side.

" The large wheels must have as little play on their axis as practicable, in order to keep them steady; but the axis may be so attached to the body of the vehicle as to allow the body to rise whenever any obstable intervenes between the outer periphery of the smaller and inner periphery or circumference of the large wheel; the large wheel to run on the ground as a detached wheel, whilst the lesser wheel moves on the inner side of the large wheel's wide rim. The action of these wheels, thus applied to any vehicle, will be that of one wheel running on the inner circumference of the rim of the other, rendering the moving of any heavy body much easier than in the common

method, and being capable of surmounting any obstable which may intervene to prevent the movement or progress of a carriage, with less physical or mechanical power, than in any other method heretofore known or used. I, the said Augustus Whiting Gillet, on behalf of George Bridgman, therefore claim the exclusive right of constructing and applying wheels, agreeably to the foregoing description, as well as the peculiar manner of their action on each other in expediting the movement of any carriage or heavy body over rough, or even smooth surfaces."—[*Inrolled in the Rolls Chapel Office. June*, 1829.]

Specification drawn by Mr. Newton.

To THOMAS WESTWOOD, *of Princes Street, Leicester Square, in the county of Middlesex, Watchmaker, for his invention of certain improvements in watches and time-keepers.*—[Sealed the 23rd of September, 1829.]

THIS invention is what may be called an eight-day watch, it only requiring to be wound up once in a week, the maintaining power being sufficient to drive the works so long a time. The general construction of the watch has no particular feature of novelty, excepting that its barrel and spring must be larger than usual, and an additional wheel introduced to connect the movements. The invention is thus described by the Patentee:—

SPECIFICATION

"As the individual parts composing a watch movement, are already well known and in use, I shall only describe the manner in which they are arranged and combined in my patent watches and time-keepers, which is as follows:—The frame consists of two circular plates, united by pillars in the usual manner. Plate XII. figs. 9 & 10, represent the pillar plate on which the calliper is drawn.

The circle *a*, represents the barrel; it occupies more than two-thirds of the diameter of the frame, and the usual height between the plates, and is what is usually termed a going barrel, having teeth on its edge, and constituting the first or great wheel. The circles *c*, *d*, and *e*, represent three wheels and pinions, usually denominated in thirty-hour movements, the centre, the third, and the fourth, from which they do not differ as far as regards their uses; and the circle *f*, represents the escapement wheel and pinion. These wheels and pinions are placed under the barrel, that is to say, between it and the dial plate, in cavities formed in the pillar plate, with cocks or bars to receive their pivots; the space between them and the upper plate being occupied by the barrel. The motion is communicated from the barrel to the wheels under it, by means of an intervening wheel and pinion, represented by the circle *b*. The teeth on the edge of the barrel act in the pinion *b*, and the wheel *b*, which is sunk, acts in the centre pinion. By referring to the diagram, fig. 9, it will be seen that the diameter of the wheel *b*, extends from its proper depth in the centre pinion to the edge of the plate; and as it cannot be placed at a greater distance from the centre of the barrel, it therefore limits the size of the barrel; but by introducing an additional wheel to communicate the motion from the wheel *b*, to the centre wheel, there will be room for a barrel of still larger dimensions. Fig. 10, represents a calliper of a movement, with the additional wheel, and a barrel of more than three fourths of the diameter of the frame; the wheel *b*, which is smaller in diameter than in fig. 9, acts in the pinion of the additional wheel, represented by the circle *z*, and the wheel *z*, acts in the teeth of the centre wheel, which has no pinion, only a plain arbor. The additional wheel being under the barrel, is sunk with its pinions, in the same

manner as the centre, third and fourth, before described. The relative velocities of the centre wheel and barrel are the same in both callipers, viz. 64 to 1. The ratios of the intermediate wheels and pinions may be varied without any material consequence. The upper plate receives the pivots of the barrel arbor, and the pinion *b*; both callipers, in the usual manner, and it also bears the jewelled cock in which the balance pivot acts. The points upon which I ground my right of exclusive privilege to the above invention and improvements, under my aforesaid recited patent, are the arrangement of the wheels and pinions, as far as regards their being placed so as to act under the barrel, that is to say, between it and the dial plate, as before described, and shown in the annexed diagrams, thereby admitting within the limits of a pocket watch of the usual size, a maintaining power of sufficient strength, with one winding up, to keep up a vigorous motion in the balance for the space of eight days, or for a longer period if required.

To WILLIAM TUTIN HAYCRAFT, *of the Circus, Greenwich, in the county of Kent, Doctor of Medicine, for his invention of certain improvements in steam engines.*—[Sealed June the 11th. 1830.]

THIS invention is for improvements in steam engines, by which very high, or which is commonly called surcharged steam, may be used without the risk of doing that injury to the piston packings, &c. which is done in engines of the common construction. The following is the

SPECIFICATION.

"These improvements are applicable to steam engines, of both high and low pressure, and also to that

combination of both, commonly called Wolff's engine, they are intended chiefly for the purpose of using that quality of steam, which is commonly known by the name of surcharged steam. I have discovered by repeated experiments, that if the ordinary steam of water be inclosed in or suffered to pass through a vessel, which is heated to a temperature of 100° Faht. higher than that at which the steam was generated, it undergoes an increase of volume about tenfold, and that this augmentation of temperature is effected by a relatively small expenditure of fuel (as may be easily understood by those who are acquainted with the known doctrines of specific heat). I have also discovered that this rarified, or as it is commonly called, surcharged steam, if it be introduced into a working cylinder of a steam engine properly constructed, will, if the said cylinder be heated to a temperature equal to that of the surcharged steam, produce mechanical power greater than that of ordinary steam, and equal to the increase of volume it has undergone, namely, tenfold, whereby a great economy of fuel is effected. This surcharged steam has been heretofore attempted to be used in steam engines, but without success; because, from its temperature and its disposition to absorb moisture, it dries or otherwise injures the packings and lubricating substances used for the pistons and joints, and from its extreme rarity it easily escapes through ordinary joints. It is, then, chiefly for the purpose of using this surcharged or rarified steam, that my improvements are designed.

"Another intention of my improvement is to enable me to use steam of a very high pressure, whether of the ordinary or surcharged steam; and is also intended to prevent the condensation of steam within the cylinder, whether of high or low pressure; which condensation, by

the subsequent evaporation, occasions an abstraction of heat, and a consequent waste of steam. My first improvement is designed for the purpose of preventing the escape of steam at the packing of the piston and piston rod, represented in the accompanying drawing at Plate XII, fig. 1, which is a sectional view of a working cylinder piston and piston rod, with the boiler and the water pipe; *a, a, a, a,* represents the cylinder; *b,* the piston; *c, c,* is the piston rod which passes out at the bottom of the cylinder, and is at its lower extremity intended to be connected with the beam, crank, and other machinery of the engine, in the ordinary way; *d, d,* is the stuffing box, by which the piston rod is made tight; *e, e,* is a water tube opening into the lower part of the boiler *f,* which, as represented, should be placed higher than the cylinder; *g,* is a branch pipe, by which the working steam is inducted and educted by suitable valves, not represented in the drawing.

"The explanation of the action of this arrangement is as follows:—If we suppose that there be steam in the boiler *f,* it will produce a pressure on the surface of the water, which pressure is communicated through the water pipe *e, e,* to the cylinder, and there acts against the under side of the piston *b.* The piston rod *c, c,* it will be observed, is of unusual thickness; the transverse sectional area of the rod should be about one-half of the area of the piston; the intention of which is, that the pressure exerted by the column of water against the piston may be diminished one-half. If in this state of things the steam be admitted by the branch *g,* to the upper part of the cylinder, it will produce a pressure on the upper side of the piston, equal to the whole area of the piston *b;* and this pressure will be twice as great as that on the under side of the piston communicated by the column of water, because the steam acts upon twice the area, the

piston will accordingly descend, displacing the column of water below it, but with a power equal only to half the pressure of the steam on the upper side; when the piston has performed its downward stroke, and the working steam is let off through the branch *g*, the pressure on the underside of the piston through the column of water, which I call the re-acting pressure, will now cause the piston to move upwards with a power equal to that with which it descended; and so on as long as the engine remains at work. Should it be inconvenient to place the boiler at a greater altitude than the cylinder, a modification of the arrangement may be made as represented in fig. 2, which is an elevation of the working cylinder *a*, as figure 1, excepting that the pipe *e*, instead of leading directly into the boiler, communicates with the vessel *h*, *h*, which I call the water cylinder. This cylinder is supplied with the water in the way hereafter to be described. The surface of the water in the cylinder *h*, should be higher than the top of the working cylinder *a*, *a*, *a*, *a*, viz. about the height represented by the dotted line. By means of the branch pipe *i*, steam from a boiler situate at any convenient distance, is introduced into the water cylinder *h*, when its pressure will produce the same reaching effect on the piston as has been explained in reference to fig. 1. In order to charge the cylinder *h*, with hot water, the pipe *k*, is carried to the bottom of the boiler, and the cock *l*, being open, and a valve in the steam pipe *i*, closed, the pressure of the steam in the boiler will force the hot water up the pipe *k*, till the vessel *h*, is nearly full. The cock *l*, being now closed, the steam is to be let on into the cylinder *h*, at the pipe *i*, in order to bring the water to its proper level, which is done by its passing down the waste pipe *m*, as shown by dots, and thence again into the boiler. To

ensure a continued supply of water in the cylinder *h*, a pump (not represented) may be applied at *n*, to be worked by the engine which feeds both it and the boiler, the superfluous water flowing into the latter by the pipe *m*.

"In the improvement thus described, it is evident that no steam can escape past the packings of the piston or its rod without first displacing the water; this it cannot do, because the usual packings and joints, although permeable to steam, are sufficiently tight to resist the passage of water even under great pressure; also the working steam, however great its pressure, cannot pass by the packing of the piston *b*, because there is an equally reacting pressure on the other side; and surcharged steam cannot injure the packings, because of the constant pressure of water.

"The only parts of this contrivance to which I claim an exclusive right, is the intervention of a column of water between the piston, and the steam of the boiler, while the working steam (whether of high or low pressure, or surcharged steam) is inducted to and educted from the working cylinder at the other side of the piston.

"My second improvement is a combination of my first already described, with an addition now to be explained, and is intended more especially for the purpose of working with surcharged steam. Fig. 3, is a side-view partly in section, representing the same as fig. 2, or the contrivance may be the same as in fig. 1, with the additions shown at fig. 4, viz.: To the piston *b*, is attached a solid plunger *p*, which is made to fit the interior of the cylinder *a, a, a, a*, and move up and down freely within it. The plunger is in length about the stroke of the engine or more, and the cylinder *a, a, a, a*, is made about twice the length of the stroke or more, or so long that the piston *b*, with its prolongation or plunger *p*, shall be able to move within the

cylinder as far as may be required for the stroke of the engine.

"The intention of this arrangement is, that the surcharged steam inducted by the branch pipe *g*, into the cylinder, above the plunger *p*, shall not enter into that part of the cylinder which is occupied with the water below the piston *b*, that the steam may not be cooled thereby, and another intention is, that the water on the lower side of the piston shall not, during the action of the engine, enter into the upper part of the cylinder, so as to cause any condensation of the steam.

"I also apply heat to the cylinder by means of fire inclosed in the brickwork *q*, *q*, taking care to surround the cylinder with fire-clay, or some other substance, to preserve it from injury, or the same object may be effected by any other convenient heating means.

"In this improvement, I claim the interposition of water between one side of the piston and the steam in the boiler, as described, together with the increased length of the cylinder and piston.

"The third improvement is simply a modification of the last,. and is represented in fig. 5, which is a side sectional view, and is intended more especially for a condensing engine, and to be used with surcharged steam; *a*, *a*, *a*, *a*, is the cylinder; *b*, the piston; *c*, the piston rod: *d*, *d*, the stuffing box; *e*, *e*, is the branch and pipe opening a communication between the upper end of the cylinder and the boiler; *f*, is the boiler; *z*, is the pipe leading into the surcharging vessel, *s*. The pipe *e*, *e*, is furnished with a valve *j*, by which the pressure of the steam on the piston may be regulated: *g*, is the pipe through which the surcharged steam passes, having been rarified in the vessel *s*: *p*, is the plunger as before described: *t*, is a branch pipe communicating within the cyilnder above the piston. At

the outward extremity of which pipe is to be attached the delivering pipe of a small forcing pump, not represented; which pump, during the action of the engine, continually forces water to the upper side of the piston. There is also another branch pipe *u*, communicating in the same way to the upper part of the cylinder, to the outward end of which is attached the feed pipe of another small forcing pipe, (not represented) by which the superfluous water is drawn from the cylinder and forced into the boiler or elsewhere. The intention of these two pumps is to cause a short column of water to be interposed between the piston and the re-acting steam from the boiler, which column of water will produce the same effects as described in the foregoing improvements.

"I also apply heat to the lower part of the cylinder, by means of a fire contained in the brickwork at *v*, *v*, taking care to defend the cylinder from the action of the fire; or I heat the working cylinder by any other convenient means.

"In this improvement I do not confine myself to any particular mode of keeping up the column of water interposed between the re-acting steam in the boiler and the piston, but as in the previously described, I claim the introduction of a column of water on one side of the piston, the working steam acting on the other side; together with the use of the plunger *p*.

"My fourth improvement applies to ordinary condensing engines, and consists of the following combinations of parts, none of which I claim separately:—First,—In addition to the ordinary boiler for supplying the working steam, I employ another boiler, which may be much smaller, and capable of sustaining the resistance of high pressure steam. Secondly,—In the adaptation of a pipe proceeding from this high pressure boiler, which communicates with an outer cylinder or jacket, surrounding or

enclosing the working cylinder in the usual way, and also another pipe issuing from this jacket, through which the high pressure steam may escape to the other boiler, from under a valve loaded to about 20 pounds on the square inch less or more. By this arrangement there is a constant circulation of high pressure steam round the working cylinder. Thirdly,—The low pressure steam is supplied by a pipe from the low pressure boiler, provided with the proper valves. Fourthly,—Both the piston and the piston rod must be provided with metallic plates, commonly called metallic packing, instead of the usual hemp packings; but I do not confine myself to any precise form of pistons, as any form that fits sufficiently accurate will answer the purpose.

"In this last improvement it is the combination only of the above recited four particulars that I claim as new, all of which combined together, and not a part or parts of the four, I have found to be essential in effecting my objects. In these my aforesaid improvements, where I speak of the re-acting steam operating through the medium of water on the piston, I do not mean to exclude any other agent capable of reaching in the same way, if such agent could be substituted for the steam in the boiler with good effect; such for instance as air or gas, confined in a suitable vessel, so as to produce the said re-action. Also the said re-action may be effected by a high column of water; and in steam engines of a moderate pressure, and in condensing engines, it may be convenient to effect the re-action by means of the pressure of the atmosphere, taking care in all these cases there shall be interposed between the piston and the re-acting agent a (sufficient) quantity of water, which water in every case where my improvements are used (with the exception of my fourth improvement) is essential in

fulfilling my intention. It is also to be understood, that where these my said improvements are applied, either to condensing or other steam engines, all those parts are to be added which belong to such construction of engines in the ordinary way. Although I prefer that the packing of the piston and piston rod should be of hemp or similar material, (except in my fourth improvement) I do not exclude the use of metallic packing; and although I do not claim any peculiar mode of sucharging the steam used in my improvements, yet I prefer the two following means combined together, viz.: I cause the feed-steam from the boiler to pass through a tube or tubes, or vessels heated by means of a fire, before it enters into the working cylinder; and secondly, by heating the steam and the working cylinder by means of a fire, or by any convenient means of heating. It is also proper to state, that as surcharged steam, owing to its high temperature, will injure and destroy the usual cements, and packings applied to the junctions of the parts of engines, it is convenient to form such junctions by hemispherical joints, by grinding the two metallic surfaces together, which I recommend to adopt in all the joints which require packing.

"The positions of the cylinders are immaterial in the employment of my improvements, except in that described under the third head, it being only necessary to observe that the boiler or water cylinder is so placed that the surface of the water therein shall be higher than the upper part of the working cylinder."—[*Inrolled in the Rolls Chapel Office, Dec. 11th* 1830.]

Specification drawn by the Patentee.

Novel Inventions.

THE inventions of Mr. A. Smith, engineer, of Princes Street, have often come under our notice, and it is with pleasure we lay the following description of his improved door springs before our readers. The common door spring has many disadvantages besides its unsightly appearance; it being weakest when it is wanted to be most powerful. These improved springs are fixed on the top or bottom of the door, and are morticed into it, so that the spring is hid from view, and are much more powerful than the common ones.

In Plate XI. figs. 7 and 8, are sections of part of a door and its lintel, the door opening only one way ; fig. 9 and 10, are like sections of a door opening both ways. The heliacal spring *a, a,* is contained within the casing *b, b* ; this casing is morticed into the top of the door, *c, c,* so as to be flush with the top edge, and is firmly fastened with screws ; on the underside of the lintel of the door frame *d, d,* is fixed the piece *e,* to this piece *e,* the connecting piece *f,* is attached by a pin joint ; this piece *f,* is also connected at its reverse end to another piece *g,* within the casing ; the end of this piece, is bent so as to press against the end of the spring, *a, a,* see fig. 7. On the upper side of the casing, is a long slot for the connecting joint, between the pieces *f,* and *g,* to slide in as the door opens. It will be seen in fig. 8, that as the door is opened, the connecting piece, *f,* fixed at one end, to the lintel of the door frame, will cause the spring to be compressed, and when the door is let go, the spring extending itself, will cause the door to shut ; figs. 9 and 10, are views of a spring of the same con-

struction, for a door opening both ways; the connecting piece *f*, in this instance, is extended at its end, and has two pins, *i, i*, fixed upon it; these pins, when the door is opened either way, come in contact with the notches in the piece *k*, as shown in fig. 10, and cause the spring to be depressed as before described. It will be seen, that the piece *k*, also serves as part of the hinge of the door.

Mr. A. Smith's Patent Paddles.

THESE patent paddles having engaged the attention of several scientific gentlemen for a short time past, we hasten to lay before our readers, an account of an experiment, tried upon the River Thames, at which we were present, on Thursday, January 27th, which completely realized the expectation of the inventor and the gentlemen present. The experimental paddles were fixed between two fine eight oared cutters, belonging to Messrs. Rawlinson and Lyon, of Stangate, each 45 feet long and 4 feet 6 inches wide; the space occupied by the paddles between the cutters was 3 feet, making the whole 12 feet wide: in the boats were fourteen persons, besides the weight of the paddles, machinery, and casing, which weighed about eight hundered weight. There were eight men turning at the winches, which work the machinery, although from the positions in which they were obliged to stand, and from their not being used to turn winch handles, their power did not amount to six effective men; but under every disadvantage of a rough stormy day, the boats were propelled from Westminster Bridge to Waterloo Bridge, a distance we believe of about five furlongs, in two minutes and 45 seconds; the tide was just at flood, the experiment being tried at half past one o'clock, time of high water, with a strong side-

wind rather adverse. After this the boats proceeded up the river to Battersea, against a rapid tide and strong wind, at an astonishing rate, and returned to Stangate. This proved to be one of the most complete experiments yet made on the river, and from what we saw of the effect of the paddles, they bid fair to give that facility to inland navigation, so much wanted. There is but very little surge from the motion of the paddles, and that in a direct line with the way of the boats, and not against the sides as in paddles of common construction, thus preventing the injury to the banks of canals, which has hitherto prevented the introduction of steam into inland navigation.

Original Communications.

Art. IV.—On Power Levers and Perpetual Motions.

To the Editors of the London Journal of Arts, &c.

Gentlemen,—You justly repudiate in your editorial strictures the numerous attempts of speculative uninformed machinists to impose upon the public, their abortive pretensions to the production, or rather to the generation of mechanical power, by any combination of levers or train of machinery contrary to the fixed laws of nature, as determined by universal experience.

Whatever is gained in relative power by such combinations is reciprocally proportionate to the loss of time, or the space passed through by the moving power—to say nothing of the increased friction beyond that of the simple lever or pulley, inherent to all compound machines. Although mechanical forces cannot be generated contrary to the above universal axiom—

yet there are several natural forces or principles of which we may avail ourselves, for the production of mechanical power. I do not advert at present to the effects of heat and electricity, but to the natural forces known under the names of attraction, repulsion, and gravitation. These are directly applicable to the production of mechanical power, and have been repeatedly applied with success in the construction of machines.

Some years ago I examined in the Palace of the Thuillieries, at Paris, a curious and most ingenious piece of machanism, the moving power of which was magenetism. It was a beautiful time-piece in one of the salons, the maintaining power of which was produced by two powerful magnets, whose positive and negative poles acted by alternate attraction and repulsion upon the pendulum, and caused its vibrating motion. This clock had been kept in motion, as far as I could learn, for several years, and excepting for the gradual wear of the train, may continue to this time.

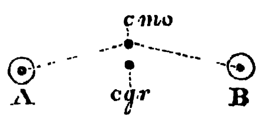
Here then is a sort of perpetual motion exhibited in an actual working machine. The doctrine of perpetual motion may be accepted in a philosophical sense, but not in the common application of the term.* The reciprocal attraction of gravitation in our planets, keeps them in their respective spheres, and effects their uniformly accelerated and retarded motions. They have, with the whole solar and planetary system of the universe, performed their unceasing evolutions for ages; and, without a new volition of the Deity, they will upon geometric principles perform the same determined motions to all eternity. The retrocession of the equinoxes is a perpetual motion of this species.

* *All motion is in its nature perpetual;* for it may be proved upon geometrical principles, that the total amount of forces required to destroy any given motion is precisely equal to the original impetus or moving power. The motion of a body once impinged—can no more be destroyed without an adequate power than could such motion have been given without an adequate power.

It is under this head of power, viz. the attraction of gravitation, that I should place the force generated, or rather exhibited, in Nicholls' power lever, (for Specification see Vol. IV. page 35, Second Series, and also Mr. Rayner's Communication.) A force applicable to mechanical purposes, is undoubtedly gained by the construction of his machine; a reference to the principles of statics will shew in what manner it is gained. I will endeavour to elucidate the subject upon these principles.

Gravitation is a property or quality decreasing as the squares of the distances from the centre increase; this is an axiom universally allowed: the forces of the attraction of gravitation are therefore reciprocally as the squares of the distances. At equal distances from the same centre of attraction, the force is proportional to the quantity of matter in the body attracted; therefore, in all cases, the force of attraction is as the quantity of matter directly, and the square of the distance reciprocally. The attraction of gravitation is strongest at the surface of the earth, below the surface, it decreases with the distance; *and above the surface, it decreases as the squares of the distances increase.* It is to this latter modification of gravitation, that we refer the generation of power in Nicholls' power-lever or rather pendulum. *This machine is a bent lever*, having, *when at rest*, the centre of motion above the common centre of gravity—thus,

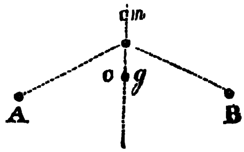
For the purpose of explanation, we must consider the weight and magnitude of each disk and its arm of this bent lever as equal; and that the total weight is thrown into the centre of gravity of the disk;



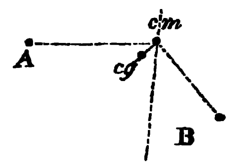
these postulata may be granted for a practical demonstration, although not strictly true.

Thus, the whole weight of each arm will be represented by its respective centre of gravity; viz. by the centre of magnitude of each circular disk; the diagram will then be thus—

The line of direction of A, tends to the point of the earth's surface immediately under it, and the line of B, to a similar point under B; for the line of direction in a heavy body is that in which it endeavours to descend; *the distance of a power* is a line drawn perpendicularly from the fixed point of any engine or lever upon the line of direction.



The distances of A, and B, as distinct weights or powers, are equal by the postulatum, when the machine is at rest. When the machine is brought by some extraneous power into this position, the distance of A, is increased, for that arm of the lever becomes perpendicular to its line of direction, in which position it has the greatest absolute and relative force. At the same time, the distance of B, is equally lessened in equal times; and its line of direction approximates to a parallel line drawn perpendicularly through the centre of motion; and consequently the absolute and relative force of B, is proportionately lessened.



The moving and sustaining power at B, is now withdrawn, and the common centre of gravity, *c g*, which has been raised towards A, descends. But A, has had an accumulated power thrown into it by its distance from the centre of motion, having been increased as in the last figure. Upon the removal of the sustaining power, A is to be considered as a suspended weight, which would fall perpendicularly with a momentum of increased velocity proportioned to the space it would pass through, *i. e.* in a ratio compounded of the quantity of matter in A, and the square of the distance from the surface of the earth, if A, should be detached from the lever in this new situation. Now, it has been found by experience, that the momentum, which a heavy body acquires in freely falling to the earth, doubles its actual force every 16 feet through which it falls, near the surface.

Thus suppose the time that a heavy body, weighing 100 lbs. takes in falling freely from the height of 64 feet, be divided into four moments or measures, the momentum or ratio of increased velocity will stand thus—

1. 2. 3. 4. moments,
1. 4. 9. 16. velocities,
3. 5. 7.
1. 3. 5., arithmetical increase of momentum at each measure, being the difference of the squares of the moments. This may be proved geometrically by 6th *Euclid, pro.* 4.

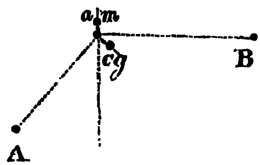
And the actual force of 100 lbs. freely falling, the 64 feet divided into 4 moments will be 200 lbs. at the end of the first 16 feet, 400 lbs. at the end of the second 16 feet, 800 lbs. at the end of the third 16 feet, and 1600 lbs. at the end of the fourth 16 feet, viz. at the surface of the ground. It is this principle of increased momentum, and consequently of force which is brought into action in pile-driving—a process that could scarcely be effected by any application of a dead weight,

In Nicholls' power-lever, the momentum of A, in descent is diminished first by the vibration of its lever, which continually moves the line of direction, and consequently the distance of A, nearer to the perpendicular let fall from the centre of motion; and, secondly, by the counterbalance of B, which, upon and during the descent of A, continually moves its line of direction and distance farther from the same perpendicular, and consequently in rising, the centre of gravity in B, is in equal time, exerting a progressive increasing power as a check to the momentum which A, would otherwise obtain in its descent. I say nothing of the resistance of the air, because, by the postulatum, the weight and magnitude of each disk and its arm are equal to the opposite, and as an elastic fluid presses equally in all directions, and the velocities of A, and B, are always equal in equal times, the resistance of the elastic medium is equal.

Now, in Nicholls' lever, and in every similar pendulum in which the centre of motion is above the common centre of

gravity, the momentum of the raised arm in the act of falling must necessarily overcome the resistance from the vibration of the descending lever, and from the weight of the ascending lever and disk. This may be proved by *props. 5 and 6, &c.* lib. 1, *Cursus Mats. Ozanam,* but the demonstrations are too long for insertion.

The disk A, therefore carries the opposite lever and disk B, to such height as determines the reciprocal equality of the forces, and the machine takes this following position :—



or a similar position, proportioned to the original impulse given by the moving power.

The same principles then operate in the descent of B, aided by a fresh application of the moving power. The alternate elevation and depression of the disks are thus continued by a proportionate small moving force : *and there is necessarily a generation, or rather a development of mechanical power, exhibited by this construction of a pendulum lever, which is applicable as a prime mover to a train of machinery.*

I trust this elucidation of the subject may prove useful, and answer the wishes of your correspondent, who appears interested in the question—whether or not a real efficient mechanical power applicable to useful purposes be gained by this lever pendulum ?

It may be permitted me again to apply a remark I made upon M. Bernhard's vacuum machine. The principles of science founded upon the undeviating laws of nature, are fixed and certain ; if facts do not immediately appear consonant to those principles, it is only because we have not sufficiently applied them to the investigation of the phenomena presented by any

particular modification of action. The demonstrations of geometry must still be applied to every thing connected with mechanical agencies, or we have no certain guides which can save us from the error of making hypothesis supply the place of correct reasoning, and sound deduction.

I am, Gentlemen, your's, &c.

ÆOLUS.

ART. V.—ON THE EMPLOYMENT OF MACHINERY.

To the Editors of the London Journal of Arts.

GENTLEMEN,—An error of the most mischievous tendency having been extensively circulated, that machinery tends to deprive the poor of labour, and as this error appears to me to arise from taking a very narrow and superficial view of the question, from looking only at partial effects and not at general results, by not considering that the comparatively few hands which may be thrown out of employment, by the introduction of machinery in any particular branch, are more than taken up by the increased demand and general extension of our commerce, occasioned by such improvement in the productive means, I am induced in hopes of correcting the prejudicial effects of such an idea, to offer the following considerations;—It may be truly affirmed, that perhaps with the exception of the last few preceding years, more hands are employed at the present time, although a period of peculiar depression and distress, than at any other period in our history. It must be quite clear to every reflecting mind, and particularly to those who are at all acquainted with public economy, that we owe the perfection and cheapness of our various fabrications to the power of machinery, in its improved and widely extended

use; and that it is this cheapness and this very perfection which originates the demand. It is the love of exchange, the desire of novelty, which gives rise to every effort of industry. It is this power of invention, which so pre-eminently distinguishes our species, at once stimulates and excites our wishes, gratifies our tastes, and perfects the condition of our nature.

Instead of looking at the power of invention—this inestimable gift, this beautiful and distinguishing characteristic of man's reasoning mind, as an evil in its use; should we not rather attribute to it all that awakens the faculties, gives birth to industry, emulates exertion, and adorns the circle of cultivated life? Who will dare argue that like the brute we should merely eat, drink, and having satisfied the immediate demand of nature, lie down to sleep; yet such would be our lamentable condition if the enemies of invention, and improvement, could effect their enslaving purpose; say to this most divine fuculty of the human mind, (the spirit and power of invention) here shalt thou stop, retard its progress by taxation, deaden its energies by restrictions, and instantly that pre-eminence in arts and manufactures, which we mainly owe to the protection and liberality of our government, and which has lifted England to her present exalted and unrivalled state, which makes her the envy and admiration of the world, and enables her to throw such preponderancy of weight in the scale of empire, will, as if touched by the withering hand of destruction, fall at once into irremediable decay and the confusion of disordered ruin. The bare supposition of such impolitic measures are absolute affronts to the wisdom and experience of any government, even the most weak and incapable, and appear on their open face to convey to the most careless eye absurdities, such as no reasonable man can fall into; it is therefore in vain to argue on them and the ruinous consequences of restrictive steps, merely for the idle perusal of those whose tempers are too volatile to inquire into and examine things for themselves; or have understandings inadequate to comprehend that which is plain and evident to almost every inferior capacity.

In the present condition of our nation it is utterly impossible to stand still—the vast continent of America pushing us on the one side, and the whole civilized continent of Europe on the other, it is no longer become a matter of choice; advance we must, and that rapidly, or by beginning to recede, though perhaps gradually and imperceptibly at first, we shall helplessly descend from the pinnacle of glory and commercial fame, to a state of insignificant nothingness, and be compelled quietly to endure from those very foreign powers which we have partly instructed, rivalled, and excelled, the pitiless taunts and reproaches so lavishly bestowed on the wreck of fallen grandeur,

Is it not then undoubtedly the duty and only line of conduct which ought to be adopted by our legislature, to remove every restriction which presses unfairly upon a majority of the population—nay, I may say the community at large, and yield the industrious persevering as easy an access and as smooth a path as possible, to success of manufacture and acquirement of wealth; and there is none more worthy of their consideration, as calculated to administer the most efficient relief under their present depressions, than the existing prejudicial and abominably mischievous corn law ; likewise to curtail every unnecessary expenditure, and reduce our curbing taxation to the lowest possible degree. Sweep away all kinds of restrictions, and afford sufficient protection to commerce, and the means resorted to for extending it in every branch; then see how improvement and invention will flourish and succeed, and by bettering the condition of the people, make them happy and comfortable. In such a state of things the facility of production would render all our articles necessary for consumption proportionably cheap, and from the increased demand in quantity, a man would obtain sufficient reward for his inventive genius, and stimulate his talents to embrace (cheerfully) greater exertion and labour.

Thus, then, it would be palpably ridiculous to repress and check this spirit of advancement (the very means by which we

have ascended to the height of splendour we now enjoy) by forbidding laws, even though expressive of the intention of a prohibitory system in the very mildest form; if almost amounting to nothing in themselves, it is the effect they are likely to produce generally that we must contemplate and dread. Our prosperity of the present crisis hangs, as it were, upon a single thread, which once snapped by the impetuous and arbitrary hand of an ignorant legislating power, will hurl us back into the mazes of former darkness, and envelope our rebuting and be-clouded faculties in the mist and gloom of semi-barbarous anarchy, henceforth to be aroused only to those riotous starts of restlessness, preceding the legarthic slumber of spirit broken apathy. A moderate willingness on the part of influential authority, to render every facility and encouragement in the reach to the inventive talent of the country, will happily avert such a disastrous train of circumstances, and by countenancing our best endeavours towards progressive perfection in machinery and manufacture, will enable us still to survey the rivalrous attempts of surrounding nations with the calm eye of triumphant superiority. Only suffer the enterprizing knowledge of mechanical genius to rest upon its own basis, and man will voluntarily stretch his expanding faculties on the rack of invention, to an indefinable and illimitable extent; one improvement will suggest and bring forward another, while each tending to diminish the expense of production, will enable us to throw our manufactured articles into foreign markets at such a rate of reduced prices, as not only to compete with, but eminently surpass the world.

By imposing duties and levying of taxes on machinery, this indispensable means and sole prop of our commercial splendour and importance, we shall cut up manufacture by the roots, and produce an effect diametrically opposite to the one above mentioned so absolutely necessary to our present welfare and future prosperity. That long and vainly hoped for possibility of underselling other powers in foreign markets being already sufficiently distant from the heavy pressure of a burdensome taxation, without

increasing such, particularly in this most essential point, or throwing frivolous but destructive obstacles in the way of improvement, it is a duty incumbent on all, both individually and as a nation, to resist every effort made to oppose its progress, or limit and curb its career.

Let the narrow minded bigots of restriction calmly and rationally consider the inevitably ruinous consequences of their madness and folly, in striking a death blow to this rapid march of invention, and not even their brazen hardihood, arising from the power and influence of ill-bestowed wealth, shall dare to contemplate the disasters and destruction which must ensue. By following their nefarious schemes, an overgrown and impoverished population would be instantly deprived of employment, without the bare possibility of subsistence, and such calamitous scenes of universal misery (which no person possessed of common fellow feeling can remotely think on without the utmost chilling horror) would start forth into a dreadful existence, no longer to be slighted and contemned as the picture of imaginary grievance, but a terrific and awful reality.

From reading your very judicious remarks on the employment of machinery, in the Journal of Arts for the present month, and considering it the duty of every Englishman to stem the torrent of error, which appears so widely spread amongst the thoughtless and illiterate, and to lend a willing assistance to refute misconceived opinions, I am induced to offer these remarks upon the improved art of manufacture in our country, and the necessity of continued improvement. Should they meet with your approbation, I propose to myself the pleasure of renewing the correspondence at some future day.

Gentlemen, I remain yours, &c, &c.

Stroudwater, Jan. 12. H. C. Harris.

APPENDIX

To the Report of the Select Committee of the House of Commons, on Patents.

Papers delivered in by John Farey, Esq.

[*British Law of Patents for Inventions.*]

(continued from p. 234.)

All merchants may buy and sell, within the realm, without any disturbance.—1378. 2 Ric. II. s. 1. c. 1.

Merchant strangers may come into, continue in, and depart forth out of the realm.—1382. 5 Ric. II. s. 2. c. 1.

All merchants, aliens and denizens, may buy and sell within this realm, without any interruption, according to the 9th Edw. III. and 25th Edw. III.—1387. 11 Ric. II. c. 7.

Neither letters of the Signet, nor of the King's Privy Seal, shall from henceforth be sent in damage of the realm, nor in disturbance of the law.—1387. 11 Ric. II. c. 10.

In a petition to the King for grants of lands, offices, &c. the value shall be expressed. All they that do demand of the king grants of lands, offices, rents or any other profits, shall make express mention in their petitions, of the value of the thing so demanded, and also of that which they have had of the King's gift (or of his predecessors) before; and unless that is truly done, and duly proved, the King's Letters Patent thereof made (on such defective petitions) shall not be of any force, but shall be annulled, to the punishment of them which have so done deceit to the King.——1399. 1 Henry IV. c. 6. explained by 1400. 2 Hen. IV. c. 2. exp. limited by 1404. 6 Hen. IV. c. 2, exp.

Assise maintainable by the disseise, against the King's patentee of lands. In case any lands or tenements be granted

by the King's patent, without title being found by inquest or otherwise, where the King's entry is not given by law, they that be put out, or disseised of their freehold, shall have a special assise of the Chancellor's grant, without other suit being made to the King in that behalf. And in case that they which be put out or disseised, do recover against the persons having such patents, they shall recover their treble damages.—1399. 1 Henry IV. c. 8. regulated by 1429. 8 Henry VI. c. 16.

The King will grant no lands, &c. but to such persons as shall deserve them. The King will abstain from making any grants, except to those persons who deserve them, as the same shall appear to the King and his Council; others who make demands for undue grants, shall be punished by the King, with advice of his Council, and such grants shall be void.—1402. 4 Hen. IV. c. 4.

Letters Patent shall bear the date of the delivery of the King's warrant into the Chancery. Every warrant for Letters Patent hereafter sent by the King to the Chancellor, the day of the delivery of the same to the Chancellor, shall be entered of record in the Chancery; and the Chancellor shall cause Letters Patents to be made upon the same warrant, bearing date the day of the said delivery in the Chancery, and not before in anywise. And if any Letters Patents be henceforth antedated, or made to the contrary of this Act, they shall be void.—1439. 18 Hen. VI, c. 1.

An Act for bringing in a fresh stream of running water to the north parts of London. This was the origin of the New River Waterwork. From the novelty of the undertaking, it was at that time considered as an invention. An explanatory Act was passed, 1606, 4 Jas. I. c. 12. It was to have been executed by the city of London, but they transferred their powers to Hugh Middleton in 1608, who completed the New River, and opened it Michaelmas-day 1613, and was created a baronet. He was ruined by the expence; but the property has since been very valuable to his descendants, as well as a great advantage to the metropolis.

An Act to enable all his Majesty's loving subjects of England and Wales, to trade freely into the dominions of Spain, Portugal and France. Notwithstanding a charter of incorporation, recently granted by the King, for a company to trade to Spain and Portugal, and excluding all others in England. Rapin, in his History of England, says, the English not being well skilled in the art of dressing and dyeing their own woollen cloths, had been accustomed to send them in a white state into Holland, where they were dyed, dressed, and part sent back to England for use. The merchant adventurers had a royal charter

from Queen Elizabeth, for transporting white undressed cloths, notwithstanding the statute 14 & 15 Henry VIII. Alderman Cockaine obtained a patent from James the First, for dressing and dyeing such cloths: and the King revoked the merchant adventurers' charter, in order that all cloths might be dyed and dressed at home; but the Dutch then prohibited the importation of dyed cloth from England, and thus shut up a great market; also the patentee did the work badly, and at a great cost; whereby the woollen trade was greatly depressed, which occasioned such clamour, that the King was obliged to permit the exportation of some white cloth, and soon after, the former state of the trade was restored. Charles II. granted a patent for exporting white cloth; it expired in 1707; and then by 6th Anne, c. 8 and 9, the exportation of white cloth was permitted, under a small duty, to encourage the dressing and dyeing trade.—1605. 3 Jas. I. c. 6.

An Act to explain a former Act, made last sessions, 3 Jas. I, c. 6, for free trading. Queen Elizabeth's patent (dated 17 June 1555) to merchant adventurers of Exeter, preserved.—1606. 4 Jas. I. c. 9.

A Patent was granted by King James I. for making Alum in England. Rapin says, the importation of Alum from abroad, was prohibited by proclamation. The manufacture had been introduced into England from abroad, without much success, till about 1600, when Sir Thomas Chaloner discovered a mine in Yorkshire. The art was brought to perfection by Sir John Bourchier. The King took the whole trade into his own hands. —1608.

King James I. granted a number of monopolies, and great complaints were made in Parliament.—1610.

A publication in print, by King James the First, against monopolies (mentioned in the Act 21 Jas.) All grants and monopolies, and of the benefit of any penal laws, or of power to dispense with the law, or to compound for the forfeiture, were declared to be contrary to the King's laws.—1610.

An Act, containing the Censure given in Parliament, against Sir Giles Mompesson, Sir Francis Mitchell, Francis Viscount Saint Albane, Lord Chancellor of England, and Edward Flood. According to Rapin, a patent had been granted by James I. to Mompesson and Mitchel, for the sole making and selling gold and silver lace, which they abused most grossly, making sophisticated lace of copper and base materials, and procuring others (who made good lace) to be fined and imprisoned for infringing their patent. Great complaints were made to Parliament; and in consequence Mitchel was imprisoned, but Mompesson escaped, and a proclamation was issued, offering a reward for his appre-

hension. The King informed the Parliament, that he was ignorant of the abuse of his patent, and would revoke it. The Lords confiscated the estate of Mompesson, who had escaped, and degraded him of his knighthood. Mitchel was also degraded, fined a thousand pounds, carried through the streets of London on a horse, with his face to the tail, and imprisoned for life. The patent for gold and silver lace, and some others, were revoked by royal proclamation.—1621. 18 Jas. I. c. 1. of Private Acts.

An Act concerning monopolies, and dipensations with penal laws, and the forfeitures thereof.—1623. 21 Jas. I. c. 3.

This Act is chiefly declaratory of what had been before held to be law by the judges. In the preamble, mention is made of the King's publication of 1610, but that it had not been enforced.

§ 1. All monopolies, and all grants, charters, and letters patent heretofore made, or hereafter to be made, to any person or persons whatsoever, for the sole buying, selling, making, working, or using of any thing within this realm; or of any other monopolies; or of power or toleration to do (or make warrant for doing) any thing against any law or statute; or to compound for, or grant to others, any penalty limited by any statute, before judgment thereupon had, and all proclamation or warrants any way tending thereto, are altogether contrary to the laws, and shall be utterly void. § 2. All monopolies, and all such grants, charters, letters patent, and proclamations as aforesaid, shall be tried by the common law, and not otherwise. § 3. All persons whatever are now, and shall be hereafter, disabled to use any such monopoly, grants, charters, letters patent, or proclamations as aforesaid. § 4. Any person being hereafter hindered or grieved by pretext of any monopoly, grant, charter, or letters patent as aforesaid, may sue to be relieved, by action in the Courts of King's Bench, Common Pleas or Exchequer, and on judgment, shall recover against them, by whom he has been so hindered or grieved, three times the damage thereby sustained. And any person procuring any such action at law, under this statute, to be stayed or delayed, by colour of any warrant, power or authority, except of the court wherein such action shall be depending, shall incur the pain of the statute of Præmunire, 16th Ric. II. c. 5 § 5. Saving letters patent heretofore granted for a term of 21 years or under, for the sole working of any new manufacture within this realm, which others, at the time of making such grant, did not use. And such of the said grants as were made for more than 21 years, shall become of no force after the expiration of 21 years from the time when they were made.

§ 6. Any declaration before mentioned, shall not extend to any letters patent and grants of privilege, for the term of fourteen years or under, hereafter to be made, of the sole working or making of any manner of new manufacture within this realm, to the true and first inventor and inventors of such manufactures, which others, at the time of making such letters patents and grants, shall not use; so as also they be not contrary to the law, nor mischievous to the state, by raising prices of commodities at home, or hurt of trade, or generally inconvenient. The said fourteen years to be accounted from the date of the date of the first letters patents, or grant of such privilege, hereafter to be made, but that the same shall be of such force as they should be, if this Act had never been made, and of none other.

§ 7. Saving all grants, privileges or authority, made or confirmed by Act of Parliament, so long as such Acts shall continue in force. § 8. Saving all warrants under Privy Seal, made by his Majesty or his successors, to the Justices of the courts of law, or Justices of the peace, giving power to hear and determine offences against any penal statute. § 9. Saving the charter to the city of London, or other borough or town corporate, or to any corporations of any art, trade or mystery, or to any company of merchants erected for the maintenance of any trade.—This exception is the foundation of patents of invention.

§ 10. Saving letters patent concerning printing; digging for and making saltpetre or gunpowder: or casting or making of ordnance, or shot for ordnance Or for any offices. § 11. Saving letters patent for digging and making alum, and for alum mines. § 12. Saving all privileges heretofore enjoyed by the hoastmen of the town of Newcastle-upon-Tyne, for selling, carrying, and shipping any pit coals out of the river Tyne; also concerning the licensing of any taverns. § 13. Saving letters patent for making of glass, granted to Admiral Sir Robert Mansel, dated 22d May, in the 21st Jas. I.; and other letters patent granted to Jas. Maxwell, Esq. concerning the transportation of calve skins, dated 12 June, in the 13th Jas. I. § 14. Saving letters patent granted to Abraham Baker, concerning making smalt, dated 16 Feb. 16th Jas. I.; also letters patent granted to Edward Lord Dudley, concerning the melting of iron ore, and making the same into cast works or bars, with sea coals or pit coals, dated 20 Feb. 19th Jas. I.—This saving for saltpetre and gunpowder annulled by 16 Chas. I. c. 21.

Note.—Lord Dudley's project has in its consequences, proved of immense value to this nation. It was brought into use about 1740.

Note.—There is no provision in this, or any other Act, to oblige a patentee to enrol any description or specification of the invention for which a patent is granted to him.

Note.—Lord Coke, in his explication of the words "generally inconvenient" in § 6, of this statute assumes it to mean, that the new manufacture for which the patent is granted, must not be generally inconvenient, instead of the privilege, which is the obvious sense; he says, "There was a new invention found out heretofore, that bonnets and caps might be thickened in a fulling mill, by which means more might be done, than by the labours of fourscore men who got their livings by it. It was ordained, (by an Act 7 Edw. VI. c. 8.) that bonnets and caps should be thickened and fulled by the strength of men, and not in a fulling mill, for it was holden inconvenient to turn so many labouring men to idleness." If this decision had been followed, it would have set aside every patent for invention.—Institutes, 3d part, c. 85.

An Act to confirm a judgment given in Chancery, for annulling certain Letters Patent granted to Henry Heron, for the sole privilege of salting, drying and packing of fish, within the counties of Devon and Cornwall.—1623. 21 Jas. I. c. 11.

A patent was granted by King Charles I. for making saltpetre and gunpowder; and in 1629, for establishing pawnbrokers in London.—1625.

A patent of extraordinary pretensions, was granted by King Charles I. to David Ramseye, Esq. He was a groom of the privy chamber: the patent was for 14 years, paying a yearly rent of 3*l.* 6*s.* 1*d.* to the King. It consists of nine articles of invention, two of which deserve notice, as indicating the origin of the steam engine; viz. "To raise water from low pitts by fire;" and "To raise water from low places and mynes, and coal pitts, by a new waie never yet in use."

Note.—The raising of water by steam, had been proposed as a philosophical principle, by Solomon de Caus, in a book he wrote in 1615, after he had been in England, in the suite of the Elector Palatine, who married the daughter of James I. Ramseye had probably some notion of carrying that principle into effect. This was many years before the Marquis of Worcester. —1630. See Rymer's Fœdera, vol. 19. p. 239.

Patents were granted by Charles I. for preserving marsh lands from inundation; making soap of English materials; also starch. In 1632, a patent for a diving project; and for a number of extraordinary schemes, which are announced very much

in the same enigmatical style as those which compose the Marquis of Worcester's celebrated Century of Inventions.—1631.

Patents were granted by Charles I. for cleaning of indigo; sedan chairs, printing a price current, soap-making, gardeners, sealing of foreign hops, weighing hay and straw, and marking butter casks. saltpetre, gunpowder, &c. In 1635, for glass-making, raisin wines, gold and silver thread, malt and brewing. In 1637, for cards and dice, maltsters' and brewers' licences, butter casks, pigs and bars of iron, and licensing hackney coachmen, wine casks used by brewers, drying hops and malt with sea coal and turf.—1634.

An Act for the free bringing in of gunpowder and saltpetre from foreign parts; and also for the free making of gunpowder in this realm. A free trade and manufacture allowed in gunpowder, and the materials for making the same, notwithstanding any letters patent for exclusive privileges in such trades; which patents had been saved by clause 10, in the statute of monopolies, 21 James I. and renewed by Charels I.—1640. 16 Chas. I. c. 21.

An Act for encouraging the manufactures of making linnen cloth and tapestry. Any persons whatsoever, natives or foreigners, may freely, and without paying any acknowledgment, exercise the trade of heckling or dressing hemp or flax; also making and whitening thread; also spinning, weaving or bleaching any kind of cloth made of hemp or flax; also making twine or nets for fishing; stoving of cordage; or making tapestry hangings; notwithstanding any law or usage to the contrary. Foreigners setting up such trades during three years in England, to have all the privileges of natural-born subjects, on taking the oaths, &c.—1663. 15 Chas. II. c. 15.

An Act to enable Edward Marquis of Worcester to receive the benefit and profit of a water-commanding engine by him invented. One tenth part of that benefit is appropriated for the benefit of the King's Majesty.—1663. 15 Chas. II. c. 12. of private Acts.

Note.—This has been supposed to be the steam-engine, but from the terms in which the Marquis states it, in his "exact and true definition of the engine," without making any mention of fires, it was most probably a different engine from that which he mentions as "a fire water-work," at No. 68, of his Century of Inventions.

An Act for granting to Sir Philip Howard and Francis Watson, Esq. the sole use of a manufacture, art or invention, for the benefit of shipping. This was a proposal to sheath or cover the bottoms of ships with thin sheet lead, as copper is now used;

it is mentioned in the Philosophical Transactions, Vol. VIII. No. 100, p. 6192.—1670. 22 & 23 Chas. II. c. 7. of private Acts.

An Act for granting a licence to his Highness Prince Rupert, Duke of Cumberland, for one-and-thirty years.—1674. 27 Chas. II. c. 4. of private Acts.

Query, was not this licence relative to some of the mechanical inventions for which Prince Rupert was distinguished. Solomon de Caus was employed in his father's court at Heidelburgh, when the prince was a child, and was probably his preceptor in mechanics.

An Act for the encouraging and better establishing the manufacture of white paper in this kingdom.—1690. 2 W. & M. sess. 1. c. 16. of private Acts.

Query, if this was not relative to the cylinder paper-mill, recently brought from Holland.

(To be continued.)

List of Patents,

GRANTED IN SCOTLAND, SINCE SEPTEMBER, 1830.

FOR an independent safety boat of novel construction. To William Dobree, county of Middlesex.—Sept. 16.

For certain improvements in distillation and evaporation. To William Shand, county of Kincardine.—Sept. 16.

For certain additions to the engines commonly called locomotive engines. To Charles Blacker Vignoles, London, and John Ericsson, county of Middlesex.—Sept. 16.

For an apparatus calculated to prevent or render less frequent the explosion of boilers in generating steam. To Joseph Cochaux, London.—Sept. 16.

For certain improvements in machines or machinery for cutting timber into veneers or other useful forms. To Alexander Craig, Mid-Lothian.—Sept. 17.

For certain improvements in the process of making and purifying sugars. To Marmaduke Robinson, jun. Westminster.—Sept. 17.

For an improved fid. To Henry George Pearce, Richard Gardner, and Joseph Gardner, Liverpool.—Sept. 22.

For certain improvements in the construction of wheels for carriages to be used on railways. To William Losh, county of Northumberland.—Sept. 22.

For an improvement in the manufacture of painting-brushes and other brushes applicable to various purposes. To Timothy Mason, Middlesex.—Oct. 16.

For an improvement in the preparing or making of certain sugars. To William Augustus Archbold, Middlesex.—Oct. 16,

For certain improvements in the apparatus or machinery used in the processes of brewing and distilling. To Æneas Coffey, Dublin.—Oct. 21.

For an improved method of lighting places with gas. To Michael Donovan, Dublin.—Oct. 21.

For an economical apparatus or machine to be applied in the process of baking for the purpose of saving materials. To Robert Hicks, Middlesex.—Nov. 11.

For certain machinery, and the application thereof to steam engines for the purpose of propelling and drawing carriages on turnpike roads and other roads and railways. To John Heaton, William Heaton, George Heaton, and Reuben Heaton, county of Warwick.—Nov. 23.

For certain improvements in printing machines. To Augustus Applegath, county of Kent.—Nov. 23.

For certain improvements in making or preparing saddle lining, saddle cloth, and girths for keeping saddles in their place on horses or other animals of burden. To Samuel Clarke, county of Devon.—Nov. 23.

For improvements in evaporating fluids applicable to various purposes. To Joseph Gibbs, county of Kent.—Nov. 24.

For certain improvements in machinery or apparatus for printing calicoes and other fabrics. To Mathew Bush, Dumbarton.—Nov. 23.

For certain improvements on locomotive and other carriages or machines applicable to rail and other roads, which improvements or part or parts thereof are also applicable to moving bodies on water, and working other machinery. To Thomas Bramley, county of Surrey.—Nov. 23.

For certain improvements on machines or apparatus for measuring land and other purposes. To James Chesterman, county of York.—Nov. 30.

New Patents Sealed in 1830.

To Daniel Papps, of Stanley End, in the parish of King Stanley, in the county of Gloucester, machine maker, for his having invented certain improvements in machinery for dressing or roughing woollen cloth.—Sealed 23d December, 2 months.

To William Wood, of Summer Hill, in the county of Northumberland, near Newcastle upon Tyne, for his having invented the application of a battering ram to the

purpose of working coal in mines.—23d December, 4 months.

To Marie Elizabeth Antoinette Perlius, late of Rue du Bac, in the city of Paris, in the kingdom of France, spinster, in consequence of a communication made to her by a native of France, for an invention of the fabrication or preparation of a coal fitted for refining and purifying sugar and other matters.—23d December, 6 months.

To John Ferrabee, of the Thrupp Mill and Foundry, in the parish of Stroud, in the county of Gloucester, engineer, for his having invented improvements in the machinery for preparing the pile or face of woollen or other cloths requiring such a process.—23d December, 6 months.

To John Blackwell and Thomas Alcock, both of Claines, in the county of Worcester, machine makers, and lace or bobbin net manufacturers, for their having invented or found out certain improvements in machines or machinery for making lace, commonly called bobbin net.—13th January, 6 months.

To Samuel Seaward, of the Canal Iron Works, in the parish of All Saints, Poplar, in the county of Middlesex, engineer, for his having invented an improvement or improvements in apparatus for economizing steam and for other purposes, and the application thereof to the boilers of steam engines employed on board packet boats and other vessels.—15th January, 6 months.

To William Parker, of Albany Street, Regent's Park, in the county of Middlesex, Gentleman, in consequence of a communication made to him by a foreigner residing abroad, for certain improvements in preparing animal charcoal.—15th January, 4 months.

To John and George Rodgers, of Sheffield, in the county of York, cutlers, and Thomas Fellows, junior, of New Cross, Deptford, in the county of Kent, Gentleman, for their having invented an improved skate.—18th January, 2 months.

To Andrew Smith, of Princes Street, Leicester Square, in the parish of St. Martin's in the Fields, and county of Middlesex, engineer, for his having invented or found out certain improvements in machinery for propelling boats and other vessels on water, and in the manner of constructing boats or vessels for carrying such machinery.—22d January, 6 months.

To John Gottlieb Ulrich, of Nicholas Lane, in the city of London, chronometer maker, for his having invented or found out certain improvements in chronometers.—22d January, 18 months.

To Charles Mepham Hannington, of Nelson Square, in the county of Surrey, Gentleman, for his having invented an improved apparatus for impressing, stamping or printing for certain purposes.—22d January, 6 months.

To Louis Schwabe, of Manchester, manufacturer, for his having invented certain processes and apparatus for preparing, beaming, printing and weaving yarns of cotton, linen, silk, woollen and other fibrous substances, so that any design, device or figure printed on such yarn, may be preserved when such yarn is woven into cloth or other fabric.—22d January, 6 months.

CELESTIAL PHENOMENA,

FOR FEBRUARY, 1831.

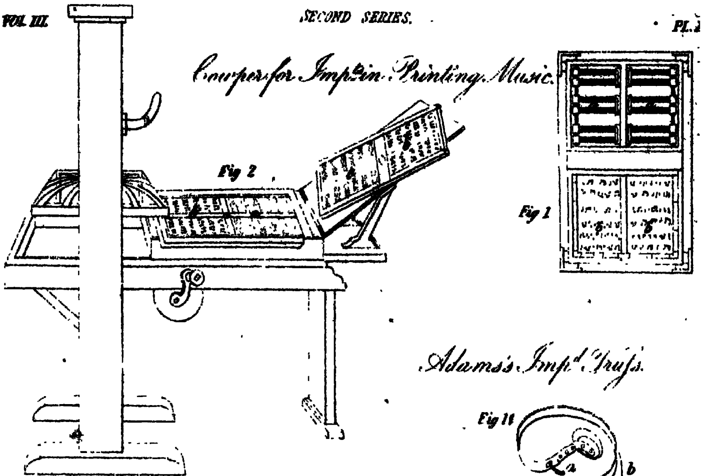
D.	H.	M.	S.	
1	5	0	0	☾ in conj. with 1 γ in Virgo
4	8	13	0	☾ in □ last quarter
4	23	0	0	☾ in conj. with γ in Libra
5	0	0	0	Clock before the ☉ 14 *m.* 19 Sec.
5	10	0	0	☾ in conj. with ψ in Libra
6	3	0	0	☾ in conj. with φ in Oph
7	0	0	0	☿ Stationary
9	8	0	0	☾ in conj. with *d* in Sagitt
10	0	0	0	Clock before the ☉ 14 *m.* 34 Sec.
10	7	0	0	☾ in conj. with ☿ long. 27½° in Sagitt ☾ lat. 2° 52' N. ☿ lat. 2° 0' N. diff. lat. 52'
12	4	59	0	Eclip. conj. or ● new moon
13	6	0	0	☽ in conj. with ♀ long. 1° in Aquarius ☽ lat. 36 S. ♀ lat. 1° 24' N. diff. of lat. 2°
13	9	0	0	☽ in conj with λ in Aquarius
13	19	0	0	☽ in conj. with φ Aquarius
14	11	0	0	♀ in conj. with λ in Aquarius
15	0	0	0	Clock before the ☉ 14 *m.* 29 Sec.
16	13	0	0	☽ in conj. with ν in Pisces
16	17	0	0	♅ in conj. with ι in Capri
17	9	0	0	☽ in conj. with 2 ξ in Ceti
17	16	0	0	☽ in conj. with μ in Ceti
18	12	0	0	☽ in conj. with f in Taurus
18	20	13	0	☉ enters Pisces
19	2	59	0	☽ in □ first quarter
19	3	0	0	♀ in conj. with θ in Aquarius
19	8	0	0	☽ in conj. with γ in Taurus
19	10	0	0	☽ in conj. with 2 δ in Taurus
19	15	0	0	in conj. with *a* in Taurus
20	0	0	0	Clock before the ☉ 14 *m.* 6 Sec.
23	0	0	0	☿ in conj. with ♃ long. 7° in Cap. ♀ lat. 23' S. ♃ lat. 27' diff. of lat. 4'
24	14	0	0	♂ in conj. with δ in Aries
25	11	0	0	☽ in conj with *a* in Leo
25	23	0	0	☽ in conj. with ε in Leo
26	2	0	0	♀ in conj. with ζ in Capri
26	3	14	15	Beginning } Eclipse of the Moon
	4	49	45	Opposition } Eclipse of the Moon
	6	11	0	End } Eclipse of the Moon
12	11	0	0	♀ in conj. with ♅ long. 8° in Cap. ☿ lat. 49' S. ♅ lat. 37' S. diff of lat. 12'
26	22	0	0	in conj. with σ in Leo
28	0	0	0	Clock before the ☉ 12 *m.* 55 Sec.
28	14	0	0	☾ in conj. with 1 γ in Virgo

The waxing moon ☽.—the waning moon ☾

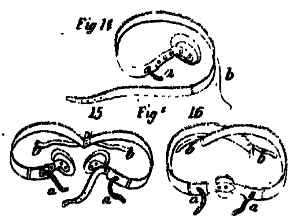
Mr. Adams' Meteorological Table, has not been received this month.

Guthrie, Printer, 15, Shoe Lane, Fleet Street.

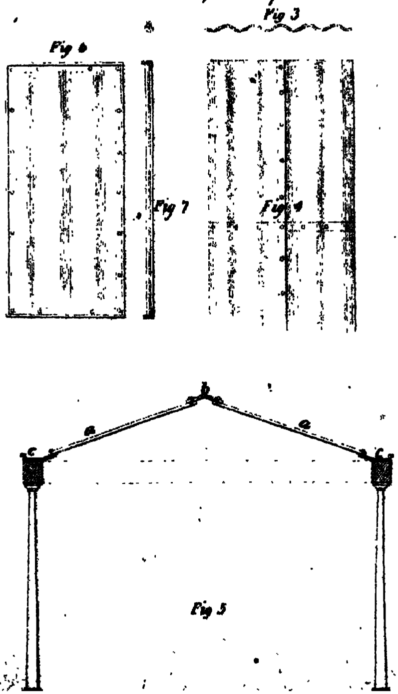
Cowper for Impt in Printing Music.



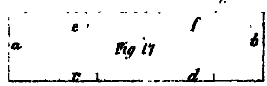
Adams's Impd. Truss.



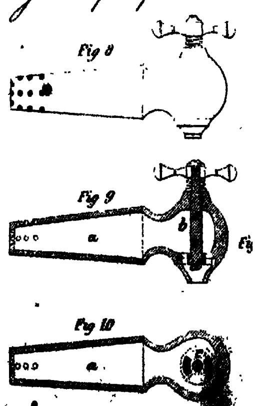
Palmer's Impd. Roofs, &c.



Pattison's Impd. Sheathing.



Ross's Impd. liquor Cocks.



Gough's Steam Carriage

Fig 1

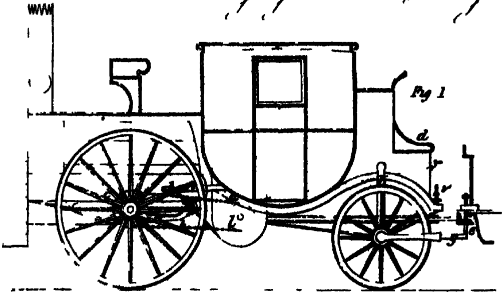


Fig 2

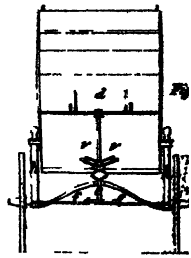


Fig 3

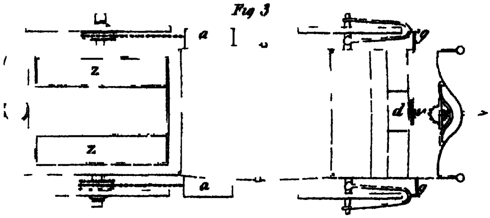


Fig 6

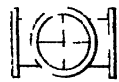


Fig. 7

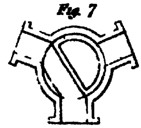


Fig 4

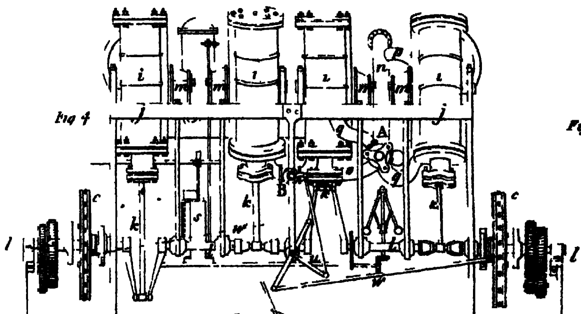
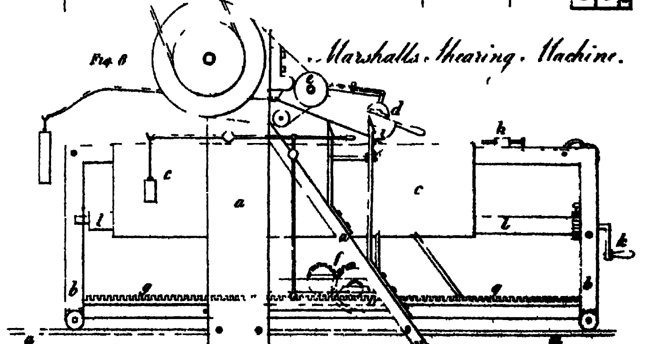


Fig. 5

Marshalls Shearing Machine

Fig. 8



THE

London

JOURNAL OF ARTS AND SCIENCES.

No. XVII.

[SECOND SERIES.]

Original Comunications.

ART. XIV.—ON BERNARD'S PATENT FOR RAISING WATER.

To the Editors of the London Journal of Arts, &c.

GENTLEMEN,—I have perused with considerable attention your account of Mr. Bernhard's Patent for raising water.—I cannot comprehend how, by the agency of any increase of temperature, that the water in the boiler should effect an elevation of forty feet above the torricellian result the increase of water as to bulk between the freezing and boiling points could not exceed one twentieth of the column; by any such operation the difference would not exceed one and half foot. As you state that the practical part is correct, I am not aware of any theoretical explanation, I presume it resolves itself into this. Is it practicable to raise water seventy feet in a tube when exhaustion has been affected, by the application of heat to any part of the external surface of the said tube, supposing the water already raised in the tube thirty feet by the air pump. If any of your cor-

respondents would be so obliging as to explain to me this difficult subject, it would confer a favour on one of your constant readers.

Yours, &c.

OBSERVATOR.

P. S. May I request from any of your ingenious readers—a simple and efficient method of keeping up a constant stream of water, through a half inch pipe, from a depth of about thirty-five feet.

Observator is not the only one of our correspondents who has expressed the same opinion on Mr. Bernhard's invention, and in which we fully concur; as however Mr. B. insists upon having made a new discovery in science, and has promised to favour us with his views of the principles upon which he raises water to the extraordinary height of seventy feet, we have thought it desirable to withhold our explanation of the experiment, until Mr. B. has put forth his own, which we hope will be in our next number.

EDITOR.

XV.—DR. WILKINSON ON SWEEPING CHIMNIES.

To the Editors of the London Journal of Arts, &c.

GENTLEMEN.—A period of more than ten years has elapsed since benevolent societies were formed for the purpose of employing Machinery for sweeping of Chimnies. When application was made to the Legislature for its interference, a Committee was appointed in the House of Lords, in order to obtain that correct information which generally results from such an investigation. I had the honour of being summoned on that occasion, and I then attempted to impress upon the minds of those noble Lords that were present the capability of sweeping, with very few exceptions, chimnies of every description, by means of an

admirably constructed apparatus, the invention of Mr. Fryer, in this city. From its construction, being of twisted canes, round a central stick of ash, or cane, it possessed every requisite pliability, so as to enable chimnies very curved being swept, that could not be effected by machines previously invented. Lord King so much approved of its construction, that, at his request, I procured one from the able engineer of the Gas Works (Mr. Eastwick), who made one for his lordship, and he superintended the manufactory of those which were liberally distributed to the chimney sweepers in this city, from the excellent institution in Monmouth street.

Some hopes were entertained that, by presenting the masters with an apparatus, and in remunerating them in proportion to the number swept, that this praiseworthy plan would have been carried into efficient execution. When the money subscribed was expended, and the machines required reparation, the stimulus no longer existing, chimnies were purposely badly swept, and soon after they had recourse to the old plan of climbing boys.

By the employment of machines it is evident that the principal labour devolved on the master; and when bribery terminated he preferred rather to be maintained by the work of the climbing boys than by his own exertions.

Within the last year, an attempt has been made to revive these societies, and principally on the supposition, that an apparatus has lately been invented by a person of the name of Glass, by which all objection to this mechanical mode of sweeping are completely obviated. The only difference between this and the one invented by Mr. Fryer, is the material employed—the new one being of bamboo, and Mr. Fryer's of eight or nine small canes twisted round a central part of ash or cane. Both are divided into lengths, but the mode of screwing in Mr. Fryer's is superior to the other. In the principle of action there is, comparatively, so little difference, as to leave no doubt that to Mr. Fryer the world is indebted for the ori-

ginality of the invention, and I believe it can be made and obtained on more reasonable terms.

I am apprehensive that, with a machine of the most perfect kind, the plan will never be generally adopted, whilst this present system, with respect to climbing boys, is continued, and particularly as we have not arrived at that degree of perfection so that every chimney can be cleansed by mechanical means; and it cannot be expected that the present proprietors of houses would be inclined to incur the expense that would attend any such required alteration; so that all which could be reasonably hoped for, would be to employ machinery where practicable, and climbing boys only in cases of necessity.

I consider of greater importance the adoption of a plan by which may be prevented the idle and ultimately dissipated habits which these climbing boys acquire, so long as their employment may be deemed in any case absolutely necessary. The little chimney sweeper, in general, finishes his work about ten o'clock in the morning; the remainder of the day is passed in idleness. Seeds of depravity are early sown; and when he has outgrown his capability of climbing, he has recourse to immoral practices for his subsistence.

About two years since, a poor fellow thus situated committed a depredation in a cabinet maker's shop for the purpose of being transported. There is one at present in this city, in the greatest distress from not having any employment, and he states that he suffered more constitutional distress by remaining in the streets early in the morning, exposed to great inclemencies of weather, frequently for hours, owing to the idleness of the servants, than from his occupation. In this respect there ought to be a regulation—for them not to be required to attend before five in the summer and six in the winter. Owing to a similar exposure, some years since, a lad named George Lane was so afflicted as as be sent to the Poor-house; he excited the attention of one of the overseers, of the name of Ewens, in Westgate-street. A

soon as the boy was enabled to leave the Poor-house, he was taken into Ewens's service: he turned out to be very attentive, punctual, and extremely valuable to his employer. In the evenings, a French gentleman, then residing on the Parades, gave him instruction, and he made such progress, that, by the time he arrived at manhood, his talents were considered competent to qualify him to go to Sierra Leone as a missionary, and he conducted himself with great credit in that settlement.

I presume to suggest the following plan:—Suppose a tinman' smith, or brazier, engaged to clean such chimnies as are practicable with machines, and to have one of the climbing boys as an apprentice to sweep those chimnies which will not admit of the apparatus; then such lad, when not employed, to be occupied in the business of his master, so that, at a future time, he would have a trade for his support; the results of the idleness above stated, would be avoided, and such a measure would soon operate to the great diminution of chimney sweepers—it would become part of another occupation, and particularly as all new houses would be built with chimnies free from those curvatures observed in many old buildings.

I know a brazier, smith, and tinman, disposed to make an arrangement as above suggested. He is one well qualified for such an undertaking, and is prepared to unite in the concern with a master chimney sweeper, and to have two climbing boys as apprentices. They would be instructed in the trades, to enable themselves to obtain a livelihood. The instruction of the master sweep would suffice for their knowledge of climbing. There is no doubt of being encouraged by every benevolent housekeeper; nor should I presume that a little difference in the charge would be regarded.

In order to carry this plan into effect, if, for the first two years, a subscription, competent to pay 8s. per week for the two boys' board, were made, the person alluded to would undertake to carry such plan into execution, by receiving one shilling

for each chimney and 1s. 6d. for kitchen chimnies, from those persons who may be disposed to employ him.

If Societies were formed in different large towns, in order to patronize a trial of this kind, the impression on my mind is, that it would more materially contribute to the melioration of this branch of society than any other I have heard of, and my trivial assistance would with pleasure be given.

C. H. WILKINSON.

Sydney Place, Bath.

Recent Patents.

To EDWARD COWPER, *of Clapham Road Place, in the Parish of St. Mary, Lambeth, in the County of Surrey, Gentleman, for his invention of certain improvements in printing Music.* —[Sealed 5th April, 1827.]

THE ordinary process of printing musical compositions on paper has heretofore been, by first engraving the subjects in plates of metal, copper, or pewter, then inking them, and taking the impressions by means of a roller-press in the manner of copper-plate printing. The adaptation of types in the way of letter-press printing to this purpose, though obviously suited to the general style and appearance of printed music, has been attended with so much difficulty as to have been hitherto considered impracticable. By the plan, however, proposed by the Patentee, the operation is rendered perfectly simple, and types, or surfaces of a similar kind to types, are applied to the printing of music with perfect ease and dispatch.

There are two particular features in this Patent which ap-

pear to constitute the subject of invention, viz. 1st. The method of constructing the form of types or blocks to be printed from; and 2dly, the manner of placing and shifting the sheets of paper to receive the impressions.

It is proposed, that the subject to be printed shall be divided into two blocks, the one containing the lines and partitions of the musical scale, the other, the notes arranged at their proper distances, and in correct order. To perfect a print, therefore of the entire subject, two impressions must be taken; that is, the scale of lines being first produced on the sheet of paper, a second impression is necessary for the purposes of printing the notes; which two impressions being made to fit exactly together (called registering), the printed subject, that is, the page of music will be complete.

The blocks for printing the page of music in this new way are shown in plate XI, at fig. 1. The compositions are placed within an iron frame or chase, and properly wedged up with quoins *a a*, are the blocks or pieces for giving the lines, made fast within the chase; *b b*, those for giving the notes.

The lines are formed by thin strips of metal set edgewise in the same way as lines are made in ordinary letter-press printing. Thin pieces of venere may be placed between each slip of metal, and the whole fastened together by glue, so as to constitute the five lines of the musical scale, or the lines may be made by several other obvious modes.

These sets of lines are to be placed within the chase at proper distances apart. They are capable of adjustment as to position, by means of the screws and nuts by which they are held at their ends; and between the sets of lines the words of the song or other poetical composition may be introduced, if necessary: which the Patentee proposes to set up in the ordinary way, with metallic letter types, and to cast them in long narrow slips of stereotype plate, which shall fit in between the sets of lines, and correspond with the situations of the notes.

The blocks *b*, *b*, containing the notes, are flat slabs of wood,

on which, in the first instance, lines are to be drawn, corresponding exactly in their positions with the lines in the other chase *a*, *a*. Upon these lines the musical composition, that is the notes of the tune, are to be written in their proper places; and when that is done, small holes are to be drilled in the wooden slabs, for the purpose of introducing pieces of wire. The ends of these wires being cut off, a little above the surface of the slab, their tops are to be dressed smooth by a fine file, leaving them standing up like round types.

The tails of the notes, designating crotchets, quavers, &c. and their connecting pieces, may be made by the introduction of small stripes or bars of metal let into the slab; and the other marks, which occasionally occur in music, such as flats and sharps, may be formed by small types, or by bent wires, or in any other convenient way.

The blocks and slabs thus formed, with the subjects upon them, being secured in the chase, and fastened on the table of the printing press, as shown at fig. 2. Two sheets of paper are to be laid upon the tympan of the press, and enclosed by the frisket, in the usual way of holding sheets of paper in ordinary printing.

It will now be perceived, that when the blocks are inked, and the impression given to the paper, one of the sheets will be printed with lines only, and the other only with the notes; instead, therefore, of removing these sheets of paper from their situation between the tympan and frisket, and laying others in the same place, the sheets thus partially printed are allowed to remain for a second impression, the tympan being turned round upon its central pivot at *z*, which brings the sheet having the notes only into the former situation of the sheet having the lines, and the sheet with the lines into the former place of that with the notes: hence on inking the form again, and turning down the tympan with the paper, the second impression perfects the subject; the notes being now printed upon the sheet which had previously received the line, and

the lines upon the sheet which had previously received the notes.

The principal thing to be observed in this contrivance, is to place the form upon the table with great accuracy, so that the central pivot *z*, on which the tympan turns, shall be exactly opposite to the centre of the form, otherwise the two impressions will not register accurately together. But if this is properly attended to, the two impressions will perfectly correspond; and, when complete, the subject printed will be as correct as if taken at one impression from a single block or plate.—[*Inrolled Oct.* 1827.]

To PHILIP DERBYSHIRE, *of Ely Place, Holborn, in the county of Middlesex, Esq. for his invention of a certain Medicine or Embrocation to prevent or alleviate Sea Sickness, which may be usefully applied to other maladies.*—[Sealed 4th Dec. 1828.]

THE malady of nausea to which so many persons are subject at sea, produces such wretched and painful sensations for the time of its duration, that any remedy which could be conveniently applied, must be highly acceptable. We are not able, upon our own experience to speak of the success of the present invention, neither does it appear to us to promise so certain a a remedy or cure as the mechanical contrivance described in Mr. Pratt's Patent, given in the Thirteenth Volume of our First Series, page 117; but the means being simple and within every ones reach, it is desirable that it should be extensively known, and we hope will be found beneficial.

To prevent the possibility of mistake, we give the description of the materials employed, and the means of using them in the words of the inventor.

SPECIFICATION

"The nature of my said invention, and the manner in which the same is to be prepared, are described and ascertained as follows:—

"In its nature it is an embrocation for sea sickness; that is to say, in some cases for preventing sea sickness, in others for curing the person afflicted with sea sickness, and in others for mitigating the severity of sea sickness.

"The manner in which it is to be performed and applied, is as follows:—Take of *crude opium* two ounces avoirdupois; two drachms of *extract of henbane*; ten grains of powdered *mace*, and two ounces of *hard mottled soap*. Boil them in sixty ounces of soft water, letting it boil for half an hour, stirring it well all the time. When cold add one quart of *spirits of wine*, at sixty degrees above proof, and three drachms of *spirits of ammonia*.

"Rub a dessert spoonful of this embrocation well in over the lower end of the breast bone, and under the left ribs, the latest time you can conveniently do so previous to embarkation, and again on board as soon as you have an opportunity. If notwithstanding this you become sick, apply the embrocation as before, and continue the application while the sickness continues."

[*Inrolled in the Inrolment Office in Chancery, May*, 1829.]

Specification drawn by the Patentee.

To HENRY ROBINSON PALMER, *of the London Docks, in the county of Middlesex, Civil Engineer, for his invention of a certain improvement or improvements in the Construction of Warehouses, Sheds and other Buildings, intended for the Protection of Property.*—[Sealed 28th April, 1829.]

SPECIFICATION.

"MY improvement or improvements in the construction of the roofs and other parts of warehouses, sheds and

other buildings, intended for the protection of property, consists in the application of metallic plates or sheets, in a fluted, indented, or corrugated form, to the purposes in relation to buildings, for which metallic plates with even or plain surfaces, have been already applied. The advantage to be derived from the form or forms proposed consists in the additional strength obtained in the metal itself, so that less aid is required from frame work supporting or attached thereto, to preserve the plates in their proper form and position.

"Various forms of the flutings, indentations, or corrugations may be adopted, but I prefer the fluted, or that which is composed of curved or waving lines, as represented in section in Plate XI, fig. 3.

"The fluted sheets, or plates of metal, may be applied to roofs of buildings, to the sides of them, to the doors, the shutters, and to partitions in the buildings, whether moveable or stationary.

"The form of the flutings, and the manner of applying the fluted sheets or plates, may vary according to circumstances, and to the taste of those who require their use; I therefore shall confine my explanation of the manner of applying them to such examples only as are necessary for the illustration of the purposes intended by me.

"Fig. 4, represents four plates or sheets rivetted together. Fig. 5, represents the section of a roof, the two sides of which *a*, *a*, are composed of fluted plates or sheets. These plates are rivetted at their upper ends to a crown plate made in an angular form, and represented at *b*. The lower extremities of the fluted plates or sheets are rivetted, or otherwise connected with a gutter composed of metal, and formed as represented at *c*, *c*. The gutters rest on bearers commonly known by the name of gutter plates, which may bear on pillars or

any other usual supports most convenient. The horizontal thrust or pressure of the roof thus formed, may be resisted by any known means most conveniently applicable.

" The application of the fluted, indented or corrugated plates or sheets to the sides of buildings, or to partitions, or to doors or shutters, is best performed by rivetting or otherwise connecting the said sheets or plates to a frame made of wood, or any other substance that may be preferred, though a frame of the same metal as the plate is best adapted for the purpose.

" Fig. 6, represents a fluted sheet or plate inserted in a metallic frame, the section of which is angular, and represented by fig. 7. In this case the sheet or plate of metal is inserted within the recess of the frame, and rivetted to the flanch all round. The figs. 6, & 7, referred to, may be considered to represent the general mode of applying my improvement or improvements to the sides of buildings, to partitions, to doors, and to shutters.

" I do not claim as my invention any particular mode of forming the plates or sheets as herein described, the means of producing such forms being well known. Neither do I claim as my improvement or improvements any particular mode of connecting the fluted, indented or corrugated sheets or plates of metal together, or the mode of attaching them to buildings, so as to form a part or parts of such buildings; but I claim as my improvement or improvements the use or application of fluted, indented or corrugated metallic sheets or plates to the roofs and other parts of buildings, as hereinbefore described.

Inrolled in the Rolls Chapel Office, June, 1829.

Specification drawn by Mr. Newton.

To Nathan Gough, *of Salford, in the county of Lancaster, Civil Engineer, for his having invented or found out an improved method of propelling Carriages or Vessels by Steam or other power.*—[Sealed 20th March, 1828.]

This invention professes to be a peculiar combination of mechanism for working a loco-motive carriage, by the power of steam. A great variety of parts are described, but the features of novelty particularly claimed appear to be the mode of connecting the running wheels to the rotatory parts of the engine; the apparatus for steering the carriage, and the construction of the valves for regulating the supply and discharge of the steam.

Plate XII, fig. 1, is a side view of the carriage; fig. 2, a view of the front, and fig. 3, a plan or horizontal view; the corresponding letters referring to similar parts in these three figures.

SPECIFICATION.

"Before I proceed to describe the nature of my improvements, which are used in my method of propelling carriages by steam or other power, I shall briefly state the method by which the power is applied for propelling the carriage, and the means by which it is guided or steered in its course;—*a*, represents an iron box, in which the engine is placed; and from a revolving shaft *l*, the power is carried by means of the chain *b*, to the hinder wheels, where every alternate loop of the chain corresponds with projections on the periphery of the wheel marked *c*. By means of this arrangement, the hinder wheels of the carriage are forced round in the direction of the arrow, and the carriage impelled onward.

"The superintendant, whose duty it is to steer or guide the carriage, is placed in the front, on the seat *d*, and it is

by means of the handles and the foot lever *v*, that he is enabled to turn the shaft *c*, on its centre.

"At the lower extremity of the shaft *c*, are firmly fixed the two arms *f*, *f*; and at the extremities of these two arms are connected rods *g*, which act on the two front wheels. The shaft *c*, also acts on the pointer in the front of the carriage, by which the superintendant is enabled to see the course he is steering more clearly.

"The front wheels of the carriage are not both placed on the same axletree, but revolve on separate ones, which are attached to the perpendicular column *h*; and it is on the centre of this column, which moves freely and is held perpendicularly by a spring, that the front wheels move in the directions required to guide the carriage.

"The advantage gained by this arrangement of the front wheels is the small power or force required to guide them; for it is obvious that the power required for placing the front wheels in any position, with regard to the movement of the carriage, must diminish in proportion to the distance of the centre round which it has to move; and in this instance it is decreased in the proportion its own centre bears to the centre of *h*, and to the centre *c*, which is the centre around which the front wheels of the carriages of the ordinary construction move, for the purpose of guiding them.

"The facility gained for moving the front wheels of a carriage of this construction, and thereby guiding its direction, will be more manifest by reference to fig. 2, where the dotted lines intersecting the front wheels of the carriage, represent a position in which those wheels might be placed, and in which position the arrangement of the apparatus for guiding them would move them on the centre *h*, and place them in any direction as regarded the

movement of the carriage, without their revolving round any centre excepting one common to their own.

" I shall now proceed to describe the construction of the engine for propelling. Fig. 4, represents a front view of the engine placed across the carriage in the box *a*; drawn on an enlarged scale; *i*, *i*, *i*, *i*, are cylinders vibrating on pivots; *k*, *k*, *k*, *k*, are their piston rods severally connected to cranks in the main axle *l*. The cranks are placed at right angles to each other, so that the two cylinders on the same shaft cannot be on their centres, or in a perpendicular position at the same time.

" The shaft *l*, on which the cranks are, is divided in the middle, so that the two cylinders on one side can be applied without interfering with the other two, and consequently the power of the steam can be applied to either two of the cylinders, as circumstances may require.

" This engine does not condense, and its power depends on the strength of the steam used for putting it in motion; *j*, is a steam chest or hollow passage, by means of which the steam is conveyed to the cylinders; and it is by means of a valve or cock *m*, that the steam is conveyed to the opposite sides of the piston, at each vibration of the cylinder.

" Steam being admitted to the upper part of the cylinder, the piston is in consequence forced down, and the connection of the piston rod with the crank causes the cylinder to vibrate; and it is this vibration which changes the course of the steam, and causes it to act on the opposite side of the piston, by means of the valve *m*.

" Steam is conveyed from the boiler to the engine by the pipe *n*, through the three way cock A, and from this cock it is conveyed by the pipe *o*, to a distributing cock B, to the cylinders of the engine. To the steam pipe *n*, is attached a pipe *p*, in which is inserted the safety valve; and

the atmospheric valve; *q*, is a pipe, by means of which the steam which is forced from the cylinder at the return of the stroke through the valve *m*, and steam chest *j*, is conducted away to what I call the heating chest behind, shown in section at fig. 5. Into this heating chest what steam may escape from the safety valve is also conducted.

" There is a vessel connected with the boiler, containing a float, by means of which the amount of water forced into the boiler by the pump *s*, is regulated. This pump is worked by a lever, which is acted upon by a cam or excentric, placed immediately beneath it on the shaft *l*. The box, containing the valves of the force pump, contains arrangements connected with the float for regulating the supply of water to the boiler.

" The wheels *c*, *c*, over which the chains *b*, *b*, pass, are placed loosely on the shaft *l*, and are connected thereto by coupling boxes. The shaft *v*, proceeds forward to the position in which the superintendant is placed, and is capable of being revolved by the two foot levers *v*; and it will be seen that by the connection of the shaft *v*, *v*, with the compound lever *u*, turning on a common centre, that any motion of the shaft *v*, must act on the connecting rods *w*, (one of which is shown by dots), and slide the clutch boxes *x*, *x*, and the wheels *c*, *c*, in and out of gear, with the crank shaft *l*.

" In the position shown in fig. 4, the wheel *c*, is connected with the shaft *l*; but by moving the foot lever *v*, the wheel *c*, would be disengaged from the shaft, and the engine no longer impart motion to it, or to the wheels of the carriage.

" By shifting one of the levers *v*, the connecting rods *w*, would be so acted upon, that the wheels *c*, might be thrown into gear either with the shaft *l*, for the ordinary propelling of the carriage, or with the wheel *y*, which

gives increased power at a slower speed, by means of a train of toothed gear. Thus in starting or going up hill, the superintendant is enabled, by the action of his foot on the lever *v*, to place the wheel *c*, on the slow speed of the engine; but when the work becomes lighter, or the carriage is proceeding on level ground, he is enabled, by a similar action, to shift the wheels *c*, and to work at the ordinary power and speed, or to disengage the connecting parts, and thereby to stop the progress of the carriage.

"In fig. 3, the platform with the back seat has been removed, to show the position of the water tank *z*, *z*, and the intermediate space, which is designed for coals."

The specification proceeds to describe a boiler and furnace, the flues of which are formed by tubes passing through the water; and the lower part of the boiler is divided by perpendicular partitions, for the purpose of preventing the water from flowing away and leaving any part of the boiler uncovered during the ascent or descent of the carriage over hilly ground.

There is also a provision for raising or lowering the chimney in case of need, which may be done by a rack and pinion turned by a winch. A variety of other parts of the carriage are also described, but as none of those parts appear to possess any novelty, we omit the description, and proceed to point out those particulars which the Patentee claims as new.

The first of these is the distributing cock B, shown at fig. 6, which is to be placed in the steam pipe, and according to the position of the plug, a greater or less quantity of the steam will be passed to the right or left, to the supply of the respective cylinders, and consequently the power exerted by the cylinders may by that means be varied. This cock is acted upon by the same train of

movements which guide the fore wheels, so that the superintendant regulates the supply.

The three way cock A, shown at fig. 7, is another feature claimed as new in its adaptation; this is for the passage of the steam from the boiler, and also for its exit from the cylinders. This cock is governed by a shaft, which is connected with the handles, under the direction of the superintendant. If it should be desired to stop the carriage suddenly, the cock must be turned, so that the steam should blow off, instead of passing through the cylinder.

The heating chamber or box, shown in section in fig. 5, is another feature considered to be new, and is constructed of sheet iron, divided into compartments; through this the steam passes from the condensor, and also from the escape of the safety valve. The water for the supply of the boiler is forced by the pump through the bent tube enclosed in this vessel, the effect of which is that the temperature of the water becomes considerably raised before it enters the boiler.

There is a float in the boiler connected with the water way of the pump, which as the water rises in the boiler, closes the supply valve, so that if the pump continues in action, no more water can be injected, but it will be returned through the cold water pipe.

The specification goes on to say, " I shall now proceed to state the manner in which these improvements may be applied to steam vessels, which would be effected by placing the paddle wheels on the shaft *l*, in the same situation as the wheels *c*; and by the application of the cock B, the steam might be distributed at pleasure to the engine connected to the paddle wheels at either side of the vessel, and thereby aid in steering or directing the course of the vessel, and obviate the necessity of using the rudder, which in all cases must more or less impede the progress

of the vessel; and with the addition of two valves of the common kind, the paddle wheels might be made to turn in opposite directions, and thereby turn the vessel on her centre; a circumstance which cannot be accomplished by the rudder now in use; and also by the application of the adjusting cock to the force pump described; the power required for supplying the boiler with water will be much diminished."

These contrivances, and also the mode of applying the power to the wheels, by means of chains, constitute the subjects of invention claimed under this Patent.

Inrolled in the Inrolment Office in Chancery, Sept. 1828.

Specification drawn by Mr. Nicholson.

To James Moore Ross, *of Symond's Inn, in the county of Middlesex, Ironmonger, for his having invented an improved Tap or Cock for drawing off Liquids.*—[Sealed 19th Jan. 1829.]

SPECIFICATION.

My invention of an improved tap or cock for drawing off liquors, consists in a method of tightening the play of the cock by means of a helical spring coiled round the stem, which brings together two parallel plates properly ground and fitted, so as to form a perfectly air and water tight joint. One of these parallel plates is fixed, the other moveable, and they have each corresponding apertures through them, which, when brought into coincidence, allows the liquor to flow; but when the moveable plate is turned round, the apertures become closed by the solid parts of the plates covering the apertures in each other. Plate XI, fig. 8, is an external view of the cock, with

the improvement adapted. Fig. 9, is a section of the same, taken longitudinally. Fig. 10, is a horizontal section of the same; *a*, is the barrel of the cock; *b*, the well or discharge part; *c*, the stem of the plug *d*, *d*, the moveable parallel plate affixed to the stem of the plug, in which are two apertures for the passage of liquor; *e*, *e*, the fixed parallel plate, forming a continuation of the barrel, this plate having similar apertures, as seen best in fig. 10; the moveable plate below, with its apertures, being shown by dots. Fig. 11, is a representation of the moveable plate *d*, as seen on the top side, and fig. 12, is the plug or stem, and discharge part detached from the cock.

After inserting the stem or plug into its socket, as shown at fig. 9, the helical spring, fig. 13, is placed over it with a washer bearing against a shoulder on the neck of the barrel. Upon the square part at the top of the plug, the cross lever or handle is fitted, and is held down by a small screw, inserted into the end of the stem, which presses the helical spring into tension, and by the reaction of this spring the moveable plate *d*, is drawn up, and held in close contact with the fixed plate *e*.

By raising or lowering the screw, the force of the spring will be diminished or increased, and hence the junction of the plates be rendered more or less tight, which prevents the possibility of leakage even by wear.

On turning the lever or handle, the moveable plate *d*, is slidden round, and the apertures brought into coincidence for the discharge of liquor; on turning the lever back again, the solid parts of the plates are made to cover the apertures, and the passage for the flow of the liquor becomes closed.

In the accompanying drawing I have shown but one of the forms in which I construct my improved taps or cocks for drawing off liquids; it must, however, be obvious that the improvement is applicable to various other forms. I wish it therefore to be understood, that I disclaim all pretensions of invention as to the forms of taps or cocks for drawing off

liquids, and limit my claim of improvement solely to the adaptation of two parallel plates or surfaces, with coinciding apertures for the passage of liquids, the surface of one plate sliding upon the surface of the other plate; whether those surfaces be truly flat, or the one concave and the other convex; and the adaptation of a spring to keep the two parallel surfaces in contact.

[*Inrolled in the Inrolment Office in Chancery, Mar.* 1829.]

Specification drawn by Mr. Newton.

To ROBERT STIRLING, *Clerk Minister of Galston, in Ayrshire, North Britain, and* JAMES STIRLING, *of Glasgow, Engineer, for their having invented or found out certain improvements in Air Engines for moving machinery.*—[Sealed Feb. 1, 1827.]

THIS is an engine constructed in the same way as an ordinary steam engine, with a piston working up and down in a cylinder, from the reciprocating action of which power is intended to be obtained for giving motion to other machinery. Instead, however, of employing steam acting against a vacuum, as the agent for moving the piston, it is proposed in the present instance to employ volumes of hot and cold air; the dissimilar elastic forces of which applied alternately on opposite sides of the piston, raise and depress it.

The volumes of air by which the engine is to be worked are contained in two vessels placed near the engine, from each of which vessels there is a pipe leading to the cylinder; the one delivering the air above the piston, the other below it. The piston therefore is worked by forcing into the cylinder one of the volumes of air, while the other is allowed to escape out of

it; and the mechanical force of the air is increased by heating the injected volume, and cooling that volume which is withdrawn.

To effect these objects, two distinct hemispherical or dome shaped furnaces are constructed, above each of which there is a corresponding hemispherical or dome shaped chamber, with cylindrical sides, containing the volume of air intended to be employed as the motive agent, and in each of the said chambers there is a piston, also hemispherically formed, exactly fitting the sides of the chamber, and working up and down therein for the purpose of expelling the air from the chamber into the cylinder of the engine.

The pistons of the two air chambers are to be raised and depressed alternately by a vibrating beam connected to the ends of their rods, which beam is to be actuated by some of the moving parts of the engine when set to work. The fires which are intended to burn with a uniform heat in the furnaces under each chamber, are for the purpose of causing the volume of air beneath each of the pistons to be heated, and of course its elastic force to be increased: while the volume above the piston becomes cooled by a blast of cold air, or a stream of cold water passed over the top of the chamber.

Depressing the piston in either of the air chambers, causes part of the volume of heated air beneath it to be forced through its pipe into the cylinder of the engine, and then to drive the piston by its elastic force, which act causes at the same time the piston in the other air chamber to rise, and thereby to draw off through its pipe the volume of air from the opposite side of the working piston.

The peculiar feature of novelty in this apparatus appears to be the construction of the pistons in the air chambers, by means of which a rapid change of temperature is effected in the air from hot to cold, and *vise versa.*

The air pistons formed as before said into hemespherical shapes, are to be several inches in thickness, and constituted of

several plates of metal with multitudes of small perforations in them. The plates are to be kept a little distance apart, either by indenting them, or by introducing small pieces of hard substances between the plates, and the whole of them being secured together constitute a colander, through which the air percolates with difficulty.

In the descent of either of the pistons, that part of the heated air which is not forced into the cylinder of the engine, passes upwards through the small holes of the piston, and becomes cooled by being brought in contact with the surface of the cold part of the air chamber, and the piston in rising again allows the air thus rendered cold to pass from the upper part of the chamber through the perforations of the piston to assist in cooling that portion of the volume of air which is being withdrawn from the cylinder.

In this way it is proposed alternately to change the temperature of the air in the two chambers with great rapidity, and taking advantage of the superior mechanical force of the air when heated, to employ it in driving the working piston of the engine.—[*Inrolled August*, 1827.]

To GRANVILLE SHARPE PATTISON, *of Old Burlington Street, in the city of Westminster and county of Middlesex, Esq. in consequence of a communication made to him from a Foreigner residing abroad, of a new and improved method of applying Iron in the sheathing of Ships and other Vessels; and of applying iron bolts, spikes, nails, pintals, braces and other fastenings used in the constructian of ships and other vessels.* [Sealed 4th September, 1828.

IT has been for some time known to the philosophical world that iron alloyed by a small portion of zinc, will be preserved from oxydation. This principle is now proposed

to be applied to the preservation of ships' bottoms, sheathed and bolted with iron; and it appears to have been proved by the most satisfactory experiments, that a small piece of zinc, placed in contact with iron, will so far attract the oxygen as to preserve the iron perfectly free from rust for any length of time; that is, until the zinc is destroyed or eaten up by the corrosion; at the same time the iron, if polished, preserves its brightness under every exposure to damp, and even to the action of sea water.

We give the explanation of the mode of applying this discovery in the words of the Patentee.

SPECIFICATION.

" The new and improved method of applying iron in the sheathing of ships and other vessels, and of applying iron bolts, spikes, nails, pintals, braces and other fastenings used in the construction of ships and other vessels, consists in the applying iron in the above cases, in such a way, and by such means, as to prevent in a great measure, if not entirely, the corrosion, rusting, or oxydation of the same, and it is effected by the following processes, that is to say,

" *First, Of the iron sheating.*—It is desirable before the iron sheathing is applied, that the bottom of the vessel should, as is usual, be well payed or coated with tar, over which paper or felt is attached. The iron sheets should be of the size of the copper sheets commonly used for this purpose.

" In applying the iron for sheathing vessels there must be attached to each sheet by soldering, rivetting, or otherwise, zinc plates, the sum of the areas of which, should bear to that of the iron sheet, about the proportion of 5 to 100, but this precise proportion is not essential. It will be

convenient to have the zinc plates from half to a whole inch in width, and about one-eighth of an inch in thickness. It is essential that zinc plates (or zinc in some form or other), should be attached to both sides of the iron sheet.

"The area of the zinc plates, attached to the outside of the iron sheets, should be larger than that of the zinc plates attached to the inside, at least this is desirable, and the proportion of three to two will be found convenient.

"The smoothest side of the iron sheet should be selected for the outside, and the zinc plates to be attached to this surface should be rivetted or soldered near that edge of the sheet, which, when attached to the vessel, will constitute its lowest edge.

"The zinc plates that are to be attached to the under surface of the sheet, may be placed on any part thereof. The following arrangement of the zinc plates will be found sufficiently convenient. See Plate XI.

Supposing *a*, and *b*, fig. 17, to represent the form of the iron sheet area 100 square inches, let *c*, *d*, be the zinc plates attached to the outer surface, the area of which amounts to three square inches, and *e*, *f*, the zinc plates attached to the inner surface (shown by dots), the area of which amounts to two square inches.

"When the sheet is attached to the bottom of the vessel, there should be a number of perforations through the zinc plates and iron sheets suitable for receiving nails.—The iron sheets should likewise in other convenient parts as are usual in common sheathing be punched, but in this case care must be taken to punch the iron sheets with small holes, barely sufficient to allow the nails to pass through them: so that they may thereby come into intimate contact with the iron sheets.

"These nails should have well formed heads. It is im-

portant that there should be the most intimate contact possible between the iron sheet and iron nails, so that the influence of the zinc plates may also extend from the iron sheet to all the iron nails.

" As in the arrangement of the sheathing, it is considered best, that the lower sheets should lap over those directly above, it will be convenient in applying the sheets to the vessel, to begin with the upper streak or row of sheets, and proceed downwards towards the keel.

" If the first row of sheets, proceeding in this manner, be arranged as in the figures, then the upper end of the second will lap over the zinc plates *c, d,* which will be thus secured from the direct action of the sea water.

" In nailing on the sheets particular care should be taken that nails be driven through those holes or perforations in the zinc plates and iron sheets into the bottom of the vessel.

" The zinc plates and iron sheets should be secured in intimate contact by rivetting or soldering; this, however, may be effected by nailing, or any other manner by which intimate metallic contact may be permanently effected; but the above described processes are considered the best. The more intimate such contact is, the more perfect will be the protection.

" Any other arrangement of the zinc plates upon the iron sheets will answer, provided they are secured in intimate contact; and a portion of the zinc plates applied to both surfaces of the iron sheets. But the arrangement as described is considered the most convenient.

" *Secondly. Of the Iron Bolts.*—Those bolts which are buried in the wood, the head alone being exposed to the sea water, are to be protected by placing beneath the head of the bolt a plate or flat ring of zinc.

" The bolt should have a broad well formed head, the

plate or flat ring of zinc should be about the form and size of the head of the bolt. But this precise form and size are not absolutely essential, provided the area of the zinc plate or flat ring be to that of the surface of the whole bolt about as 5 to 100.

"The plate of zinc should be from about one-eighth to one-fourth of an inch in thickness, with a hole perforated in its centre, so as to form a flat ring, or washer, or burr, as it is sometimes called, and slipped over the shaft or shank of the bolt, so that when it is driven well home, the zinc plate will be in intimate contact with the under surface of the head of the bolt.

"The contact between the zinc plate and iron bolt should be as complete as possible, to secure which the under part of the head of the bolt should be freed from rust, dirt, and foreign matter, and the bolt be driven well home.

"Those bolts which penetrate through the sides of the vessel, will be more completely preserved by placing plates or washers of zinc (in addition to those under the heads of the bolts), over the inner ends of the bolts, and securing them by nuts of iron rivetted, screwed, or clenched, so that complete contact exists between the nuts and zinc plates.

"*Thirdly. Of the iron spikes.*—Iron spikes are protected by means of washers or plates of zinc, in a manner similar to that described in speaking of bolts. The proportion between the surface of the plate of zinc and that of the spike, should be as above described. The heads of the spikes should be larger and better formed than those usually employed at present in ship building; the spikes should be driven well home, so that their heads may be in contact with the zinc plates.

"Whenever bolts or spikes are placed in those parts of

the vessel where they are constantly or even occasionally immersed in the sea, the plank or other wood, should be countersunk or excavated, so as to admit the heads of the bolts or spikes below the external surface of the plank or other wood. Wooden plugs should then be driven tightly in over the head of the bolt or spike, by which the free access of the sea water to the zinc plate, will be in some measure prevented.

"When so great an excavation would weaken the plank or other wood too much, the object may be obtained by having the head of the bolt or spike concave underneath, so that when it is driven home, the edges of the head of the bolt or spike will be driven into the wood, so as to exclude sufficiently the access of the sea water to the zinc plates.

"It is not the object of this arrangement to exclude entirely the access of the sea water, this is neither desirable nor practicable, humidity being indispensable to the protecting influence of the zinc plates upon the iron bolts or spikes. The object is, as far as possible, to place the bolt or spike under similar circumstances as when immersed in small quantities of sea water. This arrangement is not indispensable, but will be found beneficial in imparting durability to the work.

"*Fourthly. Of the iron nails.*—The iron nails used as fastenings in ships and other vessels, will be sufficiently protected by having their heads made larger than usual, of a circular form, and concave underneath, into which cavity melted zinc may be poured, or in which a plate or flat ring of zinc of a suitable size and thickness, may be placed, and the nail driven well home; the edges of the head of the nail will be driven into the wood, and thus serve sufficiently to protect the zinc plate from the free access of the sea water.

"*Fifthly. Of the rudder braces and pintals.*—Zinc plates

from a quarter to a half of an inch in thickness, or thereabouts, the area of which bears to that of the surface of the rudder braces about the proportion of 5 to 100, are to be secured by rivetting or soldering, or in any other manner which will secure intimate metallic contact to each pintal and brace.

"It is proper that a part of the zinc plates should be secured on each shank, and in a proportion to both the inner and outer surfaces of the rudder braces and pintals. Perforations should be made through the zinc plates and rudder braces and pintals.

"After the rudder braces and pintals have been secured in the usual manner to the vessel and rudder, small spikes or large nails should then be driven through the above named perforations, into the wood of the vessel and rudder.

"It is highly desirable that the bolts, spikes, or other fastenings, by which the rudder braces and pintals are secured to the rudder and vessel, should fit closely into the holes they are intended to occupy, so that when they are driven home, they shall be in as close contact as possible with the rudder braces and pintals. Unless this is carefully attended to, the preserving influence of the zinc plates will not extend so perfectly from the rudder braces and pintals to these fastenings; and the bolts or spikes used for securing the pintals and braces to the rudder and vessel, may pass through the zinc plates.

"It should be observed, that though in this specification the proportions of zinc and iron to be used are stated to be about as 5 to 100 for preserving the iron fastenings and sheathing of ships and other vessels, yet it is not indispensable that so large a portion of zinc should be used, and a larger proportion than 5 to 100, may be adopted if desired.

" In all the instances mentioned in this specification, where zinc plates or sheets are used for preventing the oxydation or rusting of the iron fastenings and sheathing of ships and other vessels, zinc alloyed, mixed or compounded with small portions of other metals, especially copper, tin and lead, may be substituted for the pure zinc. The most suitable proportions of such other metals to that of the zinc, will vary from three to ten per cent.

" In this specification, plates, sheets, and washers of zinc, of various forms and thicknesses, have been mentioned, it should, however, be observed, that these particular forms and thicknesses are not indispensable, but only such as have been found most convenient in effecting the different objects of this invention.

" The zinc should be closely connected with both sides of the iron sheet. Nails should be driven through the perforations in the zinc plates and iron sheets, into the bottom of the vessel, and the other holes with which the sheet is perforated should be barely large enough to allow the nails to pass.

" *Lastly*—Be it observed, that the invention as to the iron sheathing, consists in the combination of the iron sheets with the zinc plates, or zinc in some other form, attached on both sides thereof; and the application of the iron sheets so combined for the sheathing of ships and other vessels, so that thereby the corrosion of such sheathing, which otherwise would arise from its immersion in sea water is, in a great measure, if not entirely, prevented.

" And as to the iron bolts, iron spikes, and iron nails, used in the fastenings of ships and other vessels, the invention consists in the said combination of the same, with the zinc washers, plates, or flat rings, and in applying the same, when so combined, to the purpose of such fastenings

of ships or other vessels, so as thereby to prevent in a great measure, if not entirely, the corrosion which otherwise would arise from their immersion in sea water."

Inrolled in the Inrolment Office in Chancery, March, 1829.

To WILLIAM MARSHALL, *of Fountain Grove, in the Parish of Huddersfield, in the county of York, Shear Manufacturer, for his invention of improvements in machinery for cutting or shearing, cropping and finishing Cloths, and other articles manufactured from wool or other raw materials.*—[Sealed 26th April, 1828.]

THIS machine for shearing the pile from woollen cloth, does not appear to possess a single feature of novelty; it consists of the following parts, see Plate XII. Fig. 8, is a side view drawn geometrically; *a, a, a,* is the standard or frame work which supports the actuating wheels, with a railway at bottom, on which the carriage *b, b,* traverses. This carriage holds the cloth *c,* tightly distended, and by traversing along carries it under the cutter *d,* to be shorn.

The cutter is constituted by two blades, the one a fixed straight edge of steel, called the ledger blade, laying upon the face of the cloth, the cloth being kept up to the edge of the cutter by a roller beneath, as a bed; and the other part of the cutter is a steel blade wound round a cylinder, which being made to vibrate by a crank movement, from the axle of the actuating rigger *e,* moves against the fixed blade, and operates like shears. The rigger may be driven by hand, or steam power, or otherwise.

The carriage with the cloth is conducted forward under the cutters by means of toothed wheels *f,* one of which

works in a rack g, g; these wheels being driven by bands or gear communicating with the shaft of the rigger. The operation of the cutter on the cloth ceases when the list on its edge arrives at the cutter, by a stop h, pushing back the catches which hold the cutter frame i, when it instantly raises the cutter off the cloth; and when this takes place, the pile having been cropped from the face of that portion of the cloth under operation, the handle or winch k, is to be turned for the purpose of rolling the cloth on the beam l, and bringing another portion of its surface up for a similar operation.

It is perfectly unnecessary for us to give a more particular description of this machine, as it is an exact facsimile, in principle, form, and operation, of one described in the Seventh Vol. of our First Series, page 281, and Plate XV, in the Specification of a Patent granted to Thomas Miles, of Dudbridge, near Stroud, Gloucestershire.

As it may, however, be desirable to ascertain what are the claims of the present inventor, we give the concluding paragraph of his specification, which is in these words:—

"Having described my improvements for cutting or shearing, cropping and finishing cloth and other articles manufactured from wool or other raw materials, I shall conclude by stating, I do not claim any separate or well known parts or portions of such machinery, but I claim such arrangement or combination of parts as are hereinbefore described, and likewise such obvious modifications of my machine, as converting the vibrating motion of the cutter into a rotatory motion; the attaching of an additional connecting rod to the excentric by means of which another set of similar knives may be worked, and thereby constitute a double machine; and also that modification by which the cloth or fabric would be submitted

to the action of the knives, in a direction from end to end instead of crosswise, as in the machine above described. All these being variations that I have already tried, and approve of, but are too obvious to require a minute description.

"And lastly, I do declare, that the speed of the various parts of my machinery hereinbefore described, as well as the means of producing the various movements, may be modified and varied by the substitution of other well known movements, those which I have used; all which variations and modifications, together with the proportions of the different parts, as well as the materials to be used in constructing those parts, must depend upon the nature of the work for which the machine may be required, and which may be attained with facility by any person of competent skill, and fit to be trusted with the construction and direction of machinery of this and a like description.—[*Inrolled June*, 1829.]

To James Andrew Hunt Grubbe, *of Stanton St. Bernard, in the county of Wilts, Clerk, for his having invented a Transmitting Heat Wall, for the ripening of Fruit.*—[Sealed 9th January, 1828.]

The intention of the Patentee is to erect thin partitions in gardens as substitutes for walls, against which fruit trees may be trained, and through which the warmth of the sun may, by reason of their thinness, be transmitted, which will greatly promote the ripening of the fruit and improve its flavour.

The material proposed to be employed for constructing these walls or partitions, is slate of the ordinary quality, in

slabs of the kind usually applied to the roofing of houses. Iron frames are proposed to be prepared for the reception of the slates, like the frames of windows, and the slates being cut to proper shapes and dimensions, may be secured in the rebates of the frame, by putty in the same way as glass.

These frames are to be from six to eight feet wide, and of a suitable height, and may be joined together side by side by rebates or flanges, and held fast by screws, bolts, pins or staples, or in any way that may be found desirable to secure them firmly.

Temporary blocks of stone may be placed along the ground to support the partitions, with cross pieces to receive standards or slight buttresses, to keep the wall or partition perpendicular; and against the face of the wall trellis work of wood, or other fit material may be placed, for the support of the branches of the trees, and to enable vines to entwine their branches round.

Walls or partitions for gardens formed in this way, will transmit the heat of the sun through them; and hence fruit, which may be growing against these walls having a northern aspect, will receive the benefit of the sun's warmth transmitted through the slates.

In the construction of these transmitting walls, the patentee does not confine himself to slate, but considers that plates of iron applied in the same way might answer the purpose nearly as well, provided that their surfaces were blackened, which would cause them to absorb more of the solar rays. Even panes of glass might answer the purpose applied, in the same manner, and perhaps some other materials might do; but it is desirable that the frames should be light enough to admit of their being removed without difficulty, in order that these partitions may be shifted from place to place, and set up in different parts of the garden, as convenience may dictate.—[*Inrolled July*, 1828.]

To JAMES STOKES, *of Cornhill, in the city of London, Merchant, for his invention of certain improvements in making, boiling, clarifying or preparing raw, or Muscovado, Bastard Sugar, and Molasses.*—[Sealed 11th Oct. 1827.]

THE object of this invention is to prepare sugar from the cane juice or molasses, of a superior quality to that obtained by the ordinary process.

The juice, say one hundred gallons, being placed in a suitable vessel for clarification, add to it fourteen pounds of charcoal in a pulverized state; seven pounds of the bark of the wild elm, and one pound of lime. Mix them well together, and when settled, skim off the foul matter from the surface. Then filter the liquor through a blanket, as usual, and afterwards boil and evaporate it to a state of crystallization.

When the sugar has become cold, mix with one hundred weight of it, one gallon of brandy, rum, gin or other spirituous liquor, and then, by hydraulic pressure, or any other means, express the molasses, which renders it fit to be put into moulds, or into casks for the market.

In adapting part of this improved process to the clarification of bastard or brown sugar, mix with the sugar spirituous liquor in the above proportions, and press out the molasses as above described.—[*Inrolled April*, 1828.]

The Patentee does not point out what part of this process he considers to be new; and for our part, we are unable to discover the novelty, as several of the materials mentioned, and the mode of applying them, have, if we mistake not, been long in use for the same purpose.

EDITOR.

To WILLIAM ALEXIS JARRIN, *of New Bond Street, in the county of Middlesex, Italian Confectioner, for his invention of certain improvements in apparatus for cooling Liquids.*—[Sealed 13th August, 1827.]

THE subject of this Patent is simply a vessel intended to be filled with ice, which is to be placed within a pan or vase containing the liquid about to be refrigerated. The form of the ice vessel is described as cylindrical, and of the same height as the outer vessel, but its precise dimensions do not appear to be of importance, and the outer or containing vessel may be of any shape agreeable to taste, and formed of china or other suitable material.

The ice vessel is to be placed in the middle of the vase, and immersed in the liquor required to be cooled; by which contrivance the caloric of fluidity may be extracted from the water, cream, or other liquor contained in the vase, and be frozen in a short time.

We have no idea in what the novelty of this apparatus is supposed to consist, no novelty is professed, and nothing more is perhaps intended, than to produce a tasty and convenient apparatus for the luxury of freezing liquids in warm weather on the table after dinner, and by way of giving importance to the apparatus, dignifying it with the title of Patent.

[*Inrolled October*, 1827.]

To THOMAS ADAMS, *of Oldbury. in, the county of Salop, Manufacturer, for his invention of certain improvements on instruments, or apparatus for the Relief or Cure of Hernia or Rupture.*—[Sealed 6th May, 1828.]

THIS instrument, three forms of which are represented in Plate XI, is applicable to inguinal, femoral, umbilical and

ventral ruptures, and although it differs but little in external appearance from many of those commonly employed; it is said to have been found greatly to surpass all others in the safety and ease which it affords to those who use it.

It may be proper to observe, that in all cases of rupture, it is of the greatest importance to regulate the pressure of the truss, according to the sensibility of the skin, the situation of the hernia, the strength and the avocations of the patient, &c. A pressure which would be sufficient to prevent the protusion of a hernia when the body is at rest, or undergoing moderate exercise, might be insufficient for this purpose during any extraordinary exertion.

A gentleman who is ruptured, requires the bearing of his truss to be much stronger when he is exerting himself, as in hunting, than when he is quiet, or walking gently. A labourer stands in need of much more support during the fatigues of the day, than in his hours of rest and relaxation. Hence it appears that a truss should be so constructed that its operations might be made to vary, not only according to the situation of the hernia, but also according to the varying circumstances under which the body of the patient might happen to be placed; for that degree of pressure which would be necessary under violent exertion, would become painful if always continued; and on the contrary, that degree of support which would be safe, and at the same time easy and comfortable at other periods, would afford inadequate security when the body is subjected to the performance of any laborious exercise.

The power of varying the pressure of a truss with facility, so as to render its operation effectual under all circumstances, is an advantage which has been long looked for, but the Patentee says has been never adequately obtained before the introduction of the present instrument.

"By means of the slide spring, now for the first time employed, the pressure of this truss may at any time be increased or diminished by the patient himself, in a moment, without

his being under the necessity of removing the truss from his body, or even rising from his seat."

The spring which gives pressure to the pad is a flat piece of steel, bent round to the curved form of the body, and enclosed within the bandage, where it is enabled to slide, and is drawn forward or backward by the straps *a*, and *b*, which are affixed to its extremities.

In order to give any required pressure with certainty, the faces of the straps *a*, are marked with graduations answering to pounds weight, by which the various pressures of the truss are accurately shown.

The pressure, when once adjusted, will not of itself vary, but if found too great, it may be instantly diminished by merely drawing the graduated end of the strap, marked *a*, towards the pad; and on the contrary, its pressure is regained or increased, by drawing the other end of the strap marked *b*, from the pad. The different figures upon the graduated strap, as they appear on its being drawn from under the covering of the truss, indicate the precise weight of pressure applied.

The single truss, fig. 14, has one slide spring, but the double and umbilical trusses have two such springs, as may be seen by reference to figures 15 and 16.

The truss, fig. 16, when applied for inguinal or femoral hernia, should be placed about three inches below the hips, and if required to be made longer or shorter (in case the pad should not press exactly on the part desired), it may be easily done by taking out the small screw near the pad, and placing it in another hole in the moveable end.—[*Inrolled November*, 1828.]

These trusses are sold in London by Mr. Reed, of Regent Circus, Piccadilly.

To Baron Charles Wetterstedt, *of Commercial Place, Commercial Road, in the county of Middlesex, for his invention of a Liquid or Composition for water proofing or strengthening Leather.*—[Sealed 4th June, 1828.]

This composition for rendering leather water proof, is proposed to be made of the following materials:—

Of rosin take sixteen pounds, and of tallow five pounds, which are to be boiled together in one gallon of linseed oil until the rosin is perfectly dissolved, and mixed with the tallow and oil; to this add one and a half pounds of spirits of turpentine, in which has been previously dissolved about an ounce and a half of caoutchouc, commonly called Indian rubber.

This composition is suited for rubbing into the soles of boots and shoes, and will render them perfectly water proof; but for the upper leathers of such articles, and for harness and other leather the following composition is proposed:—

Take of neatsfoot oil one gallon, of tallow six pounds, of hogs lard eleven pounds, and of bees wax half a pound; which being boiled together until perfectly mixed, must be allowed to cool, and after its having become cold, add to the composition three pounds of spirits of turpentine, in which three ounces of caoutchouc (Indian rubber) has been dissolved.—[*Inrolled December,* 1828.]

The Patentee has not stated what he claims as new in this composition. Our opinion is, that every one of the articles mentioned have been either applied to render leather water proof, or to form water proof substitutes for leather.

Editor.

Novel Inventions.

1829.

Propelling Vessels.

Among the great variety of improved plans for propelling vessels which have recently become the subjects of Patents, a contrivance proposed by Mr. Perkins, the engineer, is remarkable for its simplicity.

The disadvantages attendant upon the ordinary propelling wheels, from the circumstance of the broad face of their paddles pressing on the surface of the water in entering, and lifting the water, in rising out of it, are obviated by passing the paddles into the water sideways giving the propelling stroke direct, and passing out of the water sideways also. The specification is not yet inrolled, but the invention consists in the two following particulars. First, the peculiar positions in which the paddle surfaces of the propelling wheels are placed, viz. in radial directions round the periphery of the wheel, and parallel to each other, but crossing the radial plains of the axis in angles of about forty-five degrees. Secondly, in placing the shaft or axle of the paddle wheel at an angle of about forty-five degrees from the direction of the keel or the side of the vessel.

The object of so arranging the angles of the paddles and the paddle wheel shaft, as respects their rotative positions to each other, and to the keel of the vessel to which they are to be applied, is for the purpose of introducing the paddle into the water edgewise, and after giving *a direct propelling stroke with the surface of the paddle at right angles to the keel,* to pass it out of the water in a similar way.

By placing the paddles in the oblique positions described, it will be perceived that the two paddles which stand at opposite points of the periphery of the wheel will have their faces situate at right angles to each other, the upper paddle always being in a line with the keel, that is edgewise, and the lower or operating paddle being at right angles to the keel; and a direct stroke of the paddle in the water in the line of the keel will be the result of this arrangement.

It certainly cannot be said that the paddles of this wheel will give as long a stroke through the water as some other constructions of wheels, in which the paddles turn upon their axles, but the circumstance of the paddles being firmly fixed, and the parts of the wheel being subject to no other movement but that upon its common axle, are advantages which at sea would perhaps recommend the present plan of Mr. Perkins before all others.

Vazie's Corn Preserver.

Our attention has been called to the great loss sustained both in the quantity and quality of corn grown in Great Britain, by the uncertain and often times tempestuous state of the weather in this island during autumn, and which the existing system of drying and gathering in that article is inadequate to guard against. This fact being notorious, renders any improvement in harvesting interesting both to the farmer and the community at large; we therefore readily admit that the introduction of a plan calculated to remedy the evil, is highly desirable.

The improvement proposed by Mr. Vazie to effect this object, described in the specification of his patent, given in our last (page 193), as far as respects the stacking of

corn, appears to have merit, and deserves trial, as by its adoption it appears probable that the corn will be effectually preserved from injury *by rain or wind, with little or no extra expense or trouble,* from the time of reaping until it is in proper condition to be housed.

The plan of inverting (a large sheaf at top like an umbrella) is simple, and we have no doubt will be found advantageous; and if so, there is reason for presuming that its general adoption may encourage the growth of corn in this country, and prevent the necessity of importing it from abroad; and by that means afford more extensive employment to the agricultural part of the community.

AMERICAN PATENTS

FROM THE FRANKLIN JOURNAL.

An improvement in the Machine for Picking Cotton; by James Pinell, and Aber Maxson, Barboursville, Cabell county, Virginia, October 10, 1828.

THE object proposed is, to turn the ordinary machine for picking cotton, by means of the foot applied on a treadle, exactly in the manner of the common turning lathe, and thus to substitute the power of men for that of horses.

The brushes used to remove the cotton from the saws are not attached immediately to the shaft, there being "two or more steel springs, fastened at one end to the stock of the brush, and at the other to the revolving shaft; the effect of which is, to admit of a vibration, which frees the brushes from the cotton, without the trouble of cleaning them."

What is claimed, "is the application of the crank, the treadle, and the fly wheel, so as to turn the same by means of the foot; and the use of the spring at the backs of the brushes."

For the use of Pine Resin as an article of Fuel for the purpose of Heating Ovens for the Baking of Bread, Bread Stuffs, Meats, and such other articles of Food as may be best cooked by baking; also for the purpose of heating hatters' kettles, used in the manufacturing and colouring hats; by Richard L. Wood, Philadelphia, October 10, 1828.

The following is the specification:—

"The manner of using the resin, is to break it in small pieces, and ignite a sufficient quantity at the entrance of the flues, so constructed as to pass around and over the top of the ovens used for baking, and under and around the kettles used by hatters; adding a sufficient quantity, from time to time, to produce the required heat."

Remarks.—The foregoing, it is presumed, was suggested by the employment of rosin in Dr. Dyott's glass house, which fact was known in Philadelphia. Although the patents were issued on the same day, the application for that for fusing glass was antecedent to that of Mr. Wood. The purposes for which rosin is proposed to be used by each differ specifically, and were not, therefore, considered as interfering applications. If the respective patentees can sustain their claim to the use of rosin, it must of course, be limited to the precise uses named by them.

A machine for Thrashing Grain, denominated the "American Thrasher;" by John W. Post, of Philadelphia, and John Ryan, of New Baltimore, Virginia, October 10, 1828.

In this machine there are to be two feeding rollers, into which spikes or teeth, formed of wire, are to be driven: the gudgeons of the upper roller work in a groove, to admit of its rising and falling with the varying thickness of the straw in feeding. The beating cylinder has two or more strips of wood, running its whole length, and armed

with strips of iron on the edges which beat out the grain; there are teeth in one or more rows, set along these strips, and behind the beating edges, for the purpose of combing in between the straws, and of thus obviating the difficulties which arise from the beaters consisting of a straight edge only. The patentees propose sometimes to omit the feeding rollers, and to substitute an arrangement of slightly projecting spikes in a straight feeding-board. Some other modifications are mentioned, as may be seen by the claim, which is, "the addition of spikes upon the beating strip attached to the cylinder, with the spikes standing back, and projecting beyond the strips; the application of two of the above beating cylinders, and the omission of the curb; the omission of the feeding rollers and the curb, by the application of one of the beating cylinders, and an arrangement of spikes immediately under the cylinder, in a straight feeding-board."

An improved Machine for Cutting Rags for the Manufacture of Paper by Moses Y. Beach, Springfield, Mass. Oct. 1, 1828.

THIS machine bears a strong resemblance to some of those used for cutting straw. There is a heavy fly-wheel turning on a stout iron shaft, the gudgeons of which rest on a strong frame; two or more arms project at right angles from the shaft of the wheel, and carry knives, or cutters; on the edge of the frame a cutter is firmly fixed, so that the others, in their revolution, pass it, and cut like the blades of shears. There is a feeding cloth passing round rollers, like that in the carding machine: upon this cloth the rags are placed, and carried by proper gearing between the cutters. By altering the gearing, the rags may be cut more or less fine, as they may be wanted.

"The inventor claims as new, the use and application of this machine for cutting rags for the manufacture of paper, by means of improvements adapting it to that use; consisting in extending the horizontal shaft through the axis, so that each end of it rests in the strong frame, thereby giving stability and uniformity to the motion of the knives; also in the increased power derived from increasing the weight and dimensions of the wheels and arms, beyond what has heretofore been used or known for any similar operations. Also in the use of the arms, one or more proceeding from the horizontal shaft, and attached to the balance wheel, or placed at a distance from it, as may be preferred; also in the use of the regulating screws which hold said knives in their places, and graduate them as required; also in all the other particulars above specified, so far as they differ from all other machines heretofore known or used."

Improvement in Window Blinds; by John Parkerson, Boston, *Massachusetts, October* 11, 1828.

THE plan proposed is to have two metal pins projecting from each end of the slats of which the blind is composed; these pins are to pass into holes made in moveable strips, confined within the edges of the frame of the blind. These strips are confined in their places, and made to traverse up and down, by means of flat disks or wheels, of metal, which turn on centre pins, between the sliding strips and frame, having each two pins in their peripheries, which pass into holes in the sliding strips, in the manner of the pins on the ends of the slats.

Improvement in the Revolving Rail, and Round Tenon Bedstead; by Garret Post, Auburn, Cayuga County, N. Y. Oct. 11, 1828.

Round sidė and end rails, with ratchet wheels and clicks, and palls, for tightening sacking bottoms, have been patented both in this country and in England. The present patent varies the use of round rails and tenons, by letting plates of metal into the posts, so as to be flush; these plates to have holes in their centres, to receive the tenons, and a circle of smaller holes at a sufficient distance from them to receive the points of bolts, fixed longitudinally in the rails, to retain them in their places, when the sacking is strained. It is also proposed, sometimes, to use the ratchet-wheel, cast so as to form a cap to the rail, having the tenon cast on to it, and affixed to the rail by screws. The rails to be tightened by a lever fitting into a hole in the rail, or by taking a hitch with a cord upon one of the pins to which the sacking bottom is fastened. The sacking is either to have holes worked in it, as usual, to hitch upon pins on the rails, or a cord is sewed within the edge of the canvass, and loops left to pass over the pins. To prevent the rails from springing, braces are formed by pieces of plank, placed edgewise, and passing from side to side, their ends being hollowed so as to fit the rails, which consequently retain these stretchers in their places.

A Machine for Cutting Files, called "Hatch's Improved File Cutter;" by John Hatch, Roxbury, Norfolk County, Mass. October 11, 1828.

This machine is intended for cutting files entirely by pressure, without a blow from a hammer. The whole instrument with its adjustments are necessarily complex; and as the object of cutting files by pressure is novel, the

patentee has not thought it necessary to claim any particular part, but has given a description of the whole.

The file to be cut is sustained upon a firm bed or anvil, the chisel, placed at the proper slope, is worked by a toggle joint, and the motion is regulated by a heavy fly-wheel. The file to be cut is carried forward by a screw, moved by a ratchet-wheel, the feed of which may be regulated. As files are taper, the bed upon which the file is cut, is raised or lowered by a sliding piece, which passes under it, and which advances with the file. The form of this piece must correspond with that of the file, being in shape exactly its reverse; that is, as files are thickest in the middle, this must be thinnest there, and diminish or increase exactly in this reversed proportion.

These are the essential features of the machine, but with respect to its operation, we have our doubts. File cutting machines have been repeatedly made, but we do not know that any of them have been found to answer so well as the hand of a clever workman; and we know that most, if not all of them have been abandoned. Two difficulties appear to us to present themselves in the action of a machine to operate by pressure; the first is, the necessity and extreme difficulty of making the blanks to be cut perfectly true, and all alike in their relative thicknesses; and without this, the guide cannot raise the bed so as to cause the cutter to bear every where with equal force. The plan proposed will not obviate this, nor do we know of any by which it can be overcome. The second difficulty which we apprehend is in the effect produced by pressure, when compared with percussion. We much doubt whether the same kind of edge will result from successive cuts by pressure, as by blows; this is a point which experience alone can decide, and we should like to know the result.

We could urge other objections, but forbear, and hope that the experience of the inventor may convict us of error in those already made.

A machine for Mortising and Tenoning Timber; by William Jackson and J. J. Speed, jun. Speedsville, Tompkins county, New York, Oct. 10, 1828.

THE general construction of this machine is that of a common saw mill in minature, there being a frame with a carriage on it, upon which the piece to be mortised or tenoned is to be secured. There is an ingenious but simple contrivance for shifting the pieces laterally, so as to adjust them, by bringing the gauge marks to the saw or chisel. A saw is strained in the frame, when tenons are to be cut; and this for mortising is to be replaced by a chisel. There is a slip rail attached to the saw frame for straining the saw, or for adjusting the chisel, so as to enter the proper depth. A feeding arm causes the carriage to advance, by working on a straight rack. The ordinary mode of working the frame is by a lever, in the manner of the common pump handle. "The chisels to be used may be the common mortising chisel, the grooved chisel, or the common mortising chisel with a steel spring on the back, having a beard on the lower end of the spring next to the chisel, to lift out the core or chips." What we claim as our invention is the particular construction, as described by us, of the set or gauge for confining and regulating the timber. Also the slip rail in the gate, regulating the depth of the chisel, and straining the saw, together with the spring chisel before mentioned." "We also claim as a new application of parts heretofore known and used, the saw gate, balance, and lever, as before described."

An improvement in the Pump for drawing Beer and Cider, Soda Water, &c. by Levi Pitkin, Rochester, Monroe county, New York, Oct. 11, 1828.

THE object proposed is to get rid of the poisonous matter contained in the metallic tubes and chambers of the pumps generally used. The following is the whole of the specification:—

"The object of this improvement is to do away the corroding, or poisonous effects of using metallic substances, or materials, in the construction of such pumps. The construction of the improved pump is the same as those now in use, the only thing claimed as new being the materials of which this improved beer pump will be constructed; which are either lignum vitæ, ebony, or other suitable wood; marble, free, or other stone; stone or earthnware."

An improved mode of constructing Stereotype Blocks; Samuel G. Goodrich, Boston, Massachusetts, October 11, 1828.

THIS is a very simple and neat contrivance, for fixing stereotype plates upon a wooden block. A strip of brass, is firmly screwed on one edge of the block, which projects in two places, above its side, so as to form a lip, to receive one edge of the stereotype plate. A notch is cut on the opposite side of the block to receive, and allow play to a moveable lip of brass, which is to confine the other edge of the plate. This moveable lip is perforated with three holes in a row. The two outer holes have wires soldered into them, which project out about two inches, and slip neatly into corresponding holes in the edge of the block. From this same edge projects a screw, which passes through the middle hole; upon this screw a nut is fitted,

and is turned, first by the fingers, and then by a small wrench, so as to cause the projecting lip to embrace the plate firmly. A brass plate, the whole length of the block, is screwed upon its edge, so as to cover the notch of the moveable lip. This plate is hollowed at its upper edge, opposite the nut, to allow it to be turned with facility.

An improvement in the art of preparing the Backlint, or Fibres of Hemp, for manufacturing purposes; by Abraham K. Smedes, of Lexington, Kentucky, Oblober 11, 1828.

AFTER separating the backlint, or fibres, from the wood, or bullen of the stalk, in an unrotted state, which may be done by hand, but more advantageously by machinery now used for that purpose, the hemp lint, or fibres, or back, to preserve it from tangling, should be loosely twisted, or tied into bundles, of a size convenient for handling. It should then be immersed in water, where it should remain until the epidermis, or thin outer membrane shall be destroyed, and until the vesicular or cellular substance which unites the longitudinal fibres, or a part of it, is also destroyed. The backlint, or fibres, may be immersed in water retained in vats, ponds, cisterns, or other convenient receptacles, or in running streams.

The time required for the preparation or completion of the process, depends somewhat on the temperature of the water; a considerable advantage results from heating the water, thereby facilitating the operation. When the water is confined in cisterns, or otherwise, from two to six days will be sufficient for the purpose of destroying the epidermis and part of the cellular substance, which may be ascertained by its becoming loose and slippery to the touch.

The hemp should then be withdrawn, and dried in the common air, or by fire. Let it then be run through the break again, which softens it, and disengages whatever particles of wood or bullen may remain attached to it, and also the cellular substance and epidermis, that may have dried upon it. It may then be applied to the scutcher, or hackled, which frees it from all the tow and dust, and leaves it in a proper state for market or use.

The great advantage resulting from the foregoing process, arises out of the ease and facility with which large portions of hemp can be prepared in a small space, and in a manner equal, if not superior, to that which is water rotted on the wood or bullen, and in a great measure removing the difficulties arising from the unhealthy and offensive effluvia growing out of the decomposition of vegetable matter.

An improvement in the mode of operating the rotary Steam Engine for Propelling Vessels, or Machinery, or for any purpose to which steam power is applied, by the application of steam to mercury; by Stillman Blake, Providence, Rhode Island, October 11, 1828.

A bucket wheel is constructed, similar to the common bucket water wheel, and either solid or close, so as to exclude any surrounding fluid from the inside. This wheel is made of iron, or any other strong material.

The wheel is enclosed within a cylindrical box or shell, which is air-tight, and sufficiently large to leave a small space between it and the surface of the wheel, for purposes hereinafter mentioned. This box is also to be made of iron, or some other strong material, in two or more parts, and secured together by bolts.

Into this box a steam pipe is introduced, and passes down between the wheel and shell, terminating nearly under the centre of the wheel.

From the upper part of the box, an eduction pipe leads to a condenser, where the steam, after having performed its office as below described, is condensed, and leaves nearly a vacuum in the upper part of the cavity between the wheel and the box, allowing the wheel to act more advantageously than it otherwise would.

The machine thus constructed, the space or cavity between the wheel and box, is filled with mercury nearly as high as the centre of the wheel. The steam is injected into the mercury, through the steam pipe, and immediately rises into the buckets, nearly under the centre of the wheel, and displaces a portion of the mercury.

The buckets, on one side of the centre of gravity of the wheel, being successively filled, or partly filled with steam, its buoyancy gives motion to the wheel, and the power afforded is in proportion as the weight of the mercury displaced exceeds that of the steam employed.

Motion is communicated to machinery, or to whatever steam power is applied, by passing the shaft of the wheel through an accurately fitted bearing, in the end of the box or shell.

It is intended that the buckets be filled about one-third part full of steam at first, and as they ascend, the pressure upon the steam is gradually diminished; it consequently expands, and at the surface occupies the whole space within the buckets, to the entire exclusion of the mercury, and afferding a proportionable increase of power.

An Improvement in the Art of Melting and Fusing Glass, and the materials for making and forming Glass; by Thomas W. Dyott, M. D. Philadelphia, Oct. 10, 1828.

The discovery and improvement consists in using the *resin of pine*, commonly called rosin, as fuel, either alone,

or together with other fuel, for the melting and fusing-glass, and the materials for making and forming glass.

The advantages of the improvement consist—in the economy of time, in bringing on a melt, two or three hours sooner than can be obtained with wood; in the greater certainty of the quality of the glass; the *bache*, or composing materials, being frequently subjected to a strong heat by a wood fire, yet, in consequence of the quality of the wood, not strong enough to fuse, no heat applied afterwards will make the glass of good quality, although it may be melted, the salt and pearl ashes being decomposed before the fusing point of heat is brought on. By the use of rosin, this difficulty is obviated, the quality of the fuel being always the same, and unaffected by a damp atmosphere.—In the greater economy of the materials, the pots containing them being frequently broken, and the metal running into the furnace, mixes with the coals and ashes, and becomes black, of less strength, and fifty per centum less in value. In the use of rosin, the glass subjected to such accident, will run out nearly clear, and be as strong as at first.—In a great economy in the cost of fuel, saved principally in the difference of labour in sawing, splitting, oven drying, and preparing the wood; and in the difference of freight and hauling for the rosin, and in the greater security of the works, the quantities of wood necessarily collected being exposed to accidents by fire, to which the rosin will not be liable.

New Patents Sealed in 1829.

To Elijah Galloway, of King Street, in the borough of Southwark, for his invention of certain improvements in steam engines, and in machinery for propelling vessels, which improvements are applicable to other purposes. 2d July—6 months.

To Jacob Perkins, of Fleet Street, in the City of London, engineer, for his invention of certain improvements in machinery for propelling steam vessels. 2d July—6 months.

To Thomas Kilby, of Wakefield, in the county of York, clerk, and Hugh Ford Bacon, of Leeds, in the same county, gentleman, for their having found out and invented a new or improved gas lamp, or burner. 2d July—6 months.

To Robert Crabtree, of Halesworth, in the county of Suffolk, gentleman, for his having invented or found out a machine, or apparatus for propelling carriages, vessels, and locomotive bodies. 4th July—6 months.

To Margaret Knowles, of Lavender Hill, Battersea, in the county of Surrey, spinster, for her invention of an improvement in axletrees, for, and mode of applying the same to carriages. 4th July—6 months.

To William North, of Guildford Place, Kennington, in the county of Surrey, surveyor, for his having invented an improved method of constructing and forming ceilings and partitions for dwelling-houses, warehouses, workshops, or other buildings, in order to render the same more secure against fire. 4th July—2 months.

To George King Sculthorpe, of Robert Street, Chelsea, in the county of Middlesex, gentleman, for his having in-

vented certain improvements on axles or axletrees, and coach and other springs. 4th July—6 months.

To Joseph Cliseld Daniell, of Limpley Stoke, in the parish of Bradford, in the county of Wilts, clothier, for his having invented certain improvements in machinery, applicable to dressing woollen cloth. 8th July—6 months.

To William Ramsbottom, of Manchester, in the county of Lancaster, journeyman shape-maker, for his invention of certain improvements in power looms for weaving cloth. 8th July—6 months.

To William Leeson, of Birmingham, in the county of Warwick, in consequence of a communication made to him by his late partner, William Taft, of the same place, deceased, for an invention of certain improvements in, or additions to, harness and saddlery, part or parts of which improvements or additions are applicable to other purposes. 8th July—6 months.

To Moses Poole, of Lincoln's Inn, in the county of Middlesex, gentleman, in consequence of a communication made to him by a certain foreigner residing abroad, for certain improvements in the apparatus for raising or generating steam, and currents of air, and for the application thereof to locomotive engines and other purposes. 8th July—6 months.

To Thomas Salmon, of Stokeferry, in the county of Norfolk, malster, for his having invented an improved malt kiln. 9th July—6 months.

To James Chesterman, of Sheffield, in the county of York, mechanic, for his having invented certain improvements on machines, or apparatus, for measuring land and other purposes. 14th July—6 months.

CELESTIAL PHENOMENA, FOR AUGUST, 1829.

D.	H.	M.	S.	
1	0	0	0	Clock before the ☉ 5' 58"
2	18	0	0	☽ in conj. with τ in Leo.
3	16	0	0	☽ in conj. with θ in Virgo.
3	22	0	0	☽ in conj. with η in Virgo.
5	0	0	0	Clock before the ☉ 5' 40"
5	0	0	0	☽ in conj. with θ in Virgo.
5	1	0	0	♀ in conj. with ρ in Leo.
6	9	0	0	☽ in conj. with μ in Leo.
7	10	13	0	☽ in ▭ first quarter.
8	1	0	0	☽ in conj. with γ in Libra.
8	10	0	0	☽ in conj. with δ in Libra.
9	3	0	0	☽ in conj. with φ in Oph.
9	18	0	0	☿ in conj. with δ in Cancer.
10	0	0	0	Clock before the ☉ 5' 4'
11	8	0	0	☿ in conj. with ♃ long. 6° in Cancer. ☿ lat. 1° 18' N. ♃ lat. 38' N. diff. lat. 40'
13	2	0	0	☽ in conj. with β in Capri.
14	10	26	0	Ecliptic opposition, or ● full moon.
15	0	0	0	Clock before the ☉ 4' 12"
15	1	0	0	☾ in conj. with θ in Aqua.
15	13	0	0	♀ in conj. with σ in Leo.
18	17	0	0	☾ in conj. with o in Pisces.
19	23	0	0	♂ in conj with ☿ long. 26° in Cancer. ♂ lat. 1° 8' N. ☿ lat. 1' 46 N. diff. lat. 38'.
20	0	0	0	Clock before the ☉ 3' 8"
20	17	0	0	♂ in conj. with α in Leo.
21	1	35	0	☾ in ▢ or last quarter.
21	11	0	0	☾ in conj. with λ in Taurus
21	13	0	0	☾ in conj. with 1 δ in Taurus
21	13	0	0	☾ in conj. with 2 δ in Taurus
21	18	0	0	☾ in conj. with α Taurus.
22	5	0	0	♀ in conj. with β Virgo.
22	23	33	0	☉ enters Virgo.
25	0	0	0	Clock before the ☉ 1" 53'
27	12	0	0	☾ in conj. wiih ξ in Leo.
27	17	0	0	☾ in conj. with o in Leo.
28	20	55	0	Eliptic conj. or ● new moon
28	21	0	0	♀ in conj. with μ in Virgo.
30	0	0	0	Clock before the ☉ 27"
30	0	0	0	☽ in conj. with τ in Leo.
33	13	0	0	☽ in conj. with β in Virgo.
30	14	0	0	☿ in conj. with σ in Leo.
31	11	0	0	☽ in conj. with μ in Virgo.
31	10	0	0	☽ in conj. with ♀ long. 5° in Virgo. ☽ lat. 19½' N. ♀ lat. 50½' N. diff. lat. 31'

☽ the waxing moon.—☾ the waning moon.

Rotherhithe. J. LEWTHWAITE.

METEOROLOGICAL JOURNAL, FOR JUNE AND JULY, 1829.

1829.	Thermo.		Barometer.		Rain in inches.
	Hig.	Low	Hight.	Low.	
JUNE 26	73	55	29,86	29,76	
27	72	46	29,62	29,50	,125
28	78	59	29,39	Stat.	,125
29	61	54	29,64	29,60	,05
30	67	50	29,67	29,65	,2
JULY 1	61	53	29,62	29,39	,25
2	68	52	29,58	29,50	,35
3	66	51	29,58	29,26	
4	66	48	29,53	29,50	,275
5	63	44	29,58	29,53	
6	65	45	29,78	29,70	,2
7	63	54	29,70	29,50	,2
8	70	51	29,72	Stat.	,2
9	62	51	29,74	29,64	
10	76	42	29,84	29,71	

1829.	Thermo.		Barometer.		Rain in inches.
	Hig.	Low	Hig.	Low.	
JUNE 11	66	55	29,55	Stat.	,025
12	68	55	29,45	29,36	,475
13	72	51	29,70	29,56	,125
14	73	55	29,82	Stat.	
15	73	55	29,86	Stat.	,15
16	67	52	29,86	29,45	
17	61	47	29,85	29,52	,125
18	63	54	29,53	29,66	,325
19	69	57	29,76	29,94	,9
20	69	46	29,99	29,94	
21	76	46	29,98	29,83	
22	75	47	30,11	Stat.	
23	72	51	30,11	30,09	
24	77	49	29,96	29,87	
25	76	59	29,84	29,76	,475

[illegible] ADAMS.

By some mistake, an improper title and description was printed with the report of Cleland's Patent in our last Number (there called Johnson's;) the Binder is, therefore, requested to cancel page 359, *and to substitute that now given in its stead.*

It is further proposed, in order to get rid of the essential oil in spirits, to mix water with it, and then to introduce the fresh chared charcoal, in the way described, which will perfectly purify it, and leave the spirit without any unpleasant flavour.

Spirits rectified in this way will be found particularly desirable for preparing aud mixing with cordials.—[*Inrolled October*, 1827.]

To WILLIAM CLELAND, *of the City of Glasgow, Gentleman, for his Invention of certain Improvements in the process of Preparing, Refining, and Evaporating Sugar.*—[Sealed 4th July, 1827.]

THIS is a method of promoting evaporation by the immersion of a rotatory worm, heated by steam, into the boiler, in which a solution of sugar or any other crystallizable material is undergoing the process of concentration.

Plate XV, fig. 6,* represents the apparatus partly in section; *a*, is a steam boiler, supposed to be constructed over a furnace in the usual way; *c*, is a pipe through which the steam passes to heat the worm; *b*, is the worm formed by the numerous coils of a long pipe; *d*, is the vessel containing the crystallizable liquor under evaporation.

The extremities of the worm pipe are carried out straight, in the direction of an axle, and bearing upon the two end supports is enabled to revolve. The steam generated in the boiler *a*, acting against the bottom of the vessel *d*, heats the material contained therein, and by causing its aqueous parts to evaporate, promotes the required concentration and crystallization of the sugar.

* Called Johnson's in the plate by mistake.

The steam which passes from the lower boiler *a*, through the pipe *b*, is admitted into the worm pipe *c*, through small holes in its axis, and from thence blowing through the pipe, passes round all the coils, and discharges itself at the opposite end into the atmosphere; or is carried away by a pipe to be condensed, or into a chimney, or in any way that may be found convenient.

The worm is made to revolve by a winch applied to the end of its axle, or by a rigger actuated by a band from a steam engine, and, as it goes round, communicates to the fluid in which it is immersed such an additional quantity of heat, as greatly promotes the evaporation; at the same time, the agitation of the liquor, caused by the rotation of the worm, assists, in a considerable degree, the crystallization.

This apparatus is also applicable to the concentration of salt, and other matters, where evaporation of the aqueous parts is required to be performed with considerable rapidity, without exposure to the immediate action of the fire.[—*Inrolled January*, 1828.]

Review of Books.

A Popular Sketch of Electro-Magnetism, or Electro-Dynamics, with Plates of the most approved Apparatus for Illustrating the principal Phænomena of the Science, and Outlines of the parent Sciences of Electricity and Magnetism. By Francis Watkins, 8vo. London, 1828.

The subjects embraced in this little volume are of the most important character as respects electro-magne-

and by which pressure opposing the supplying force, may be relieved in the moment when free action is necessary. I do not claim the invention of this principle of supply by equalization of pressure, but only certain improvements on the principle which will work it more effectually and more safely.—A, represents an external elevation of this apparatus, and B, a section of the same, taken vertically; *a*, is a close vessel communicating with a boiler *b*, by tubes *c*, *c*, and *d*; *e*, *f*, *t*, are valves shutting off communication; *g*, a float; *h*, a guide; *i*, a lever to work the valve; *f*, *k*, a supply pipe with a valve *l*, opening upwards; *m*, a hollow float. If the float *g*, is so contrived, that when the steam in the boiler *b*, is at a given pressure, and the water at a given height, the valve *e*, shall be closed,—and if the regulator H, be so contrived, that at the same pressure it shall maintain the valve *t*, in its close position,—and if the valve *f*, be closed by the lever *i*,—then if the vessel *a*, be full of water, none will flow into the boiler; but if the water becomes low, and the float *g*, descends, the valve *e*, is first opened, and the steam will rise from the boiler into the vessel *a*, above the float *m*, for which may be substituted a diaphragm or a bag of air or gas. When an equilibrium between *a*, and *b*, is formed by the ascent of the steam, water will flow into the boiler through *d*; and when a vacuum is produced by condensation, a supply may readily be given to *a*, by the pipe *k*.

The float *g*, should be so poised, that the pressure of steam upon the valve *e*, shall assist its flotation, until the water nearly leaves the float; it will then drop and not again rise, until nearly covered with water; an interval for the action of the steam will thus be given. The valve *f*, is not opened until an interval after *e*, has been opened. This arrangement is necessary for the increments of action and for the prevention of sudden pulsion of the valves. The

float *m*, or other suitable contrivance, will prevent the sudden contact of steam with the colder fluid, and too rapid condensation, and will otherwise assist the delivery of the liquid.

The contrivance H, upon any sudden increase of pressure, assists the other valves and also the supply of water, at a high temperature, to the receiver; and will, upon any occasion of danger, relieve the pressure from the supplying force.—[*Inrolled in the Rolls Chapel Office, December* 1838]

Specification drawn by Messrs. Newton and Berry.

To JOHN FREDERICK BOURNE, *of Manchester, in the county of Lancaster, engineer, and* JOHN BARTLEY, Junior, *of the same place, engineer, for their invention of certain improvements in the construction of wheels to be used upon railways or other roads, and which improvements are also applicable to the construction of wheels in general.*—[Sealed 6th September, 1838.]

THESE improvements in the construction of wheels to be used upon railways and other roads, and which improvements are also applicable to wheels in general,—consist, firstly, in the peculiar method of preparing and putting together the ordinary parts of such wheels, as the felloe, spokes, and nave; and, secondly, in the application of certain machinery or apparatus for the purpose of bending the tyre, hoop, or rim, of locomotive engine or other wheels to be employed upon railways, or of any other wheels where loose or separate tyres are used.

In order that these improvements may be more particularly explained, we have attached to these presents two

sheets of drawings, and marked the same with figures and letters of reference, in correspondence with the following details. We will firstly describe our improvements as suitable to that description of wheels, which are to be employed upon railways, and to be composed entirely of wrought iron, and illustrated in Plate X.

We form the nave of the wheel, by taking two straight pieces of bar iron, of about three inches square, and when heated, bend each of them into a ring of the size of the intended nave, as in fig. 1, at *a*, or the nave may be formed by taking a solid mould from the forge, and cutting or forging it to the required form. We then take twenty-four pieces (more or less, according to the number of arms of the intended wheel) of flat bar iron, about three inches by one and a quarter inches, each of them half the length of the intended arm or spoke, with sufficient allowance for welding; and having formed a head to each of them, as in *b*, fig. 1, we "jump" or weld, six (more or less) of them on to each ring or semi-nave in such a manner that the longest section of the arm (namely, three inches), shall stand in the direction of the running course of the wheel, having the edge of the arm towards the front of the engine, and the flat surface to the side, as in fig. 2, *a*, *a*, *a*. The remaining twelve pieces (more or less) or semi-arms, are next to be welded on to twelve pieces (more or less) of flat bar iron, say five and a quarter inches by one inch and a quarter, and of the length of one-twelfth part of the circumference of the periphery or rim of the wheel, as at *c*, *c*, in fig. 1; and during this process of welding, the arm is placed into, and the segment of the felloe on to a block, and hammered thereupon, which will give the segment the proper curve to form the periphery of the wheel, as commonly practised; six or one-half of the number of the semi-arms thus formed upon the felloes, and the semi-arms also

formed upon each ring or semi-nave, are then to be welded together at the joints *b*, *b*, *b*, in fig. 2, and will thus present the forms as represented in figs. 3 and 4; all the arms or spokes in fig. 3, being set or "dished" one way, and all the arms in fig. 4, being set or dished the reverse way, as shewn in the detached sectional fig. 5. The portion of the wheel, fig. 3, is then taken and laid upon the portion of the wheel, fig. 4, in such a manner, that all the segments *c*, *c*, *c*, shall form an entire rim or felloe, and all the arms or spokes *d*, *d*, *d*, in fig. 3, exactly intersect the spaces between the arms *d*, *d*, *d*, in fig. 4; thus presenting an entire wheel as shewn in the front view, fig. 6, and in section in fig. 7. Small angular pieces are then to be cut out of the points of contact of the segments forming the felloe, and corresponding v pieces are to be welded in their place, as at *e*, *e*, *e*, in fig. 8, in the usual manner, in order to ensure a good welding, and thus form a solid felloe. The wheel will now be found entire, and of solid wrought iron, as well as possessing considerable strength and durability, having the peculiar advantage of having each alternate arm dished in opposite directions, in order to resist any lateral pressure; and also, having all the arms placed edgewise to the line of motion,—so that, when the wheel is revolving, the smallest portion or narrowest edge shall be presented to the resistance of the atmosphere. Moreover, if power be applied from the axle to the periphery of the wheel, it will proceed through the arms or bars of iron placed in the best position to communicate that power without yielding,—namely, with their longest section opposed to it. The wheel in the state just described, is now fit for the lathe, in order to have the felloe turned to the proper cone and flanch, or to receive an ordinary outside hoop or tyre, which is to be shrunk or contracted, and rivetted on in the usual manner. The complete or finished wheel is shewn

in front view, at fig. 9, and an edge view at fig. 10; although we consider the above described wheel, as the best calculated for locomotive engine wheels, particularly the "*driving wheels,*" yet, we would not confine ourselves to flat arms for such purposes, as they may be of round bar iron, as in fig. 11, or of any other suitable form; but put together in the manner above described.

Another description of wrought iron wheel, of a cheaper construction and more suitable for waggons or carriages, we construct, by first preparing a straight bar (either flat, upon its surface, or made with a flanch, as upon railway tyres), of the full length of the periphery or felloe of the intended wheel, and "jumping up," or welding one-half of every spoke or arm at equal distances, apart from the straight bar or tyre, as shewn in fig. 11*; the bar is bent either in the ordinary way, or by a process hereafter to be described, in order to form the felloe of the wheel, and assumes the form of fig. 12; every alternate semi-spoke, is then set or "dished" one way, and every other one is "dished" in the reverse direction. The cross fig. 13, consisting of one ring, forming the semi-nave, and a portion, or half the number of spokes welded thereto, is then placed in the position represented by dotted lines in fig. 12, and welded to the other half of the corresponding semi-spokes, at *a*, *a*, *a*, *a*, so that the eye *c*, in fig. 13, shall be exactly in the centre of the wheel; another semi-nave, exactly similar to fig. 13, is then to be placed above this, and its semi-spokes placed to correspond with the remaining semi-spokes on the felloe, and these must also be welded together at *b*, *b*, *b*, *b*; the opening in the felloe or tyre is then shut and welded, and the wheel complete, as represented in fig. 14. A good waggon or carriage wheel may also be made upon the same plan as the one last described, by having the arms welded upon the tyre bar in their whole

length, and bending the tyre bar to form the felloe, thus bringing all their ends towards the centre, where they may have a nave cast around them.

Another improved construction of wrought iron wheel, with a cast iron nave, is represented in fig. 15. This wheel is constructed by taking a straight bar, (or segments, if preferred), with or without a flanch, according to the wheel required, and of the same length as the periphery or circumference of the wheel; holes are then to be punched at equal distances apart, and of corresponding number, with the number of spokes required, and the holes countersunk, so that they taper towards the centre of the wheel;—arms rounded at the ends to fit the holes in the tyre, and having a collar or shoulder at the distance of half an inch or more from the same end, and flattened and punched at the other end, are to be prepared, and the rounded end heated, which is then to be put into the hole made in the tyre and rivetted therein, as shewn in fig. 16; and each alternate arm, set or "dished" in opposite directions, as shewn in the sectional fig. 17; a cast iron nave is then to be cast in the centre, embracing and fastening all the other ends of the arms, when it may either be finished with a plain rim, or be provided with an outer tyre. Figs. 18 and 19, represent two descriptions of spokes adapted to this wheel; fig. 18, being round arms, and fig. 19, flat or square.

It will also be evident that, wheels of a simpler construction, and to be employed for lighter purposes, may be made upon the foregoing principles; but with only one set of arms, instead of a double set, and all "dished" or set in the same direction; or, if it should be preferred, the spokes may be set perpendicularly.

The second feature of our improvements is shewn in sheet 2, of the drawings, and consists in the application of certain

mechanism or apparatus, for the purpose of bending the tyre, iron, or bars, by mechanical power, instead of the usual method of bending them by manual labour. Fig. 20, represents a side elevation of a machine to be used for this purpose; and fig. 21, a plan or horizontal view of the same, as seen from above. The framing of the machine is shewn at *a, a, a, a,* carrying the shafts *b, b,* and *c;* the shafts *b, b,* are mounted in pedestals in the frame, and the shaft *c,* is supported by adjustable bearings, sliding in mortices in the frame *a, a.* Upon the upper ends of the shafts *b, b,* are two rollers *d, d,* having grooves turned in their peripheries, corresponding with the flanch upon the tyre bar; and upon the upper end of the shaft *c,* is mounted a plain roller *e,* to form the flat under surface of the hoop or tyre. In rolling the hoop or tyre, we first cut the bar to the required length, and heat it in a stove or furnace to a red heat, and after having bent it slightly edgewise on a block, sufficiently to allow for the difference in thickness between the flanched edge and the other, we pass it between the rollers *d, d,* and *e,* as shewn in the drawings. The rollers are then turned by means of a driving strap passed around the fast pulley *f,* upon the main shaft *g,* which actuates the bevilled wheels *h, h,* and spur wheels *i, i,* keyed upon the shafts *b, b,* carrying the rollers. The diameter of the circle or the size to which the tyre iron is to be rolled or bent, is determined by the regulating screws *k, k,* which cause the roller *e,* to approach or recede from the rollers *d, d,* and consequently to vary the curve thus given to the tyre bar. *l, l, l, l,* is a light platform of rollers, for the purpose of supporting the tyre iron while it is in its heated state and under the process of bending.

The detached fig. 22, represents the necessary alteration required to be made in the roller *e,* when the machine is to be used for bending a tyre iron which has arms or semi-

arms welded to it, as in fig. 22, when it will be evident that the roller *e*, must have a groove or recess *m*, formed in it to allow the arms or semi-arms to pass.

Having now described each particular of our invention, and the manner in which the same is to be performed, we desire it to be understood, that we claim as our invention, firstly, the manner in which such wheels are constructed or put together, as are represented in the various figures of the drawings, and above described; and secondly, in the application of such or similar apparatus, as represented in figs. 20 and 21, of the drawings, for the purpose of bending tyre bars or hoops, to be attached to locomotive engine wheels and all other wheels, where loose or separate tyres are applied.—[*Inrolled in the Rolls Chapel Office, March* 1839.]

Specification drawn by Messrs. Newton and Berry.

To Benjamin Goodfellow, *of Hyde, in the county of Chester, mechanic, for his invention of certain improvements in metallic pistons.*—[Sealed 18th December, 1838.]

This improvement in metallic pistons consists in the particular construction and arrangement of certain parts of such apparatus, in order to render them perfectly steam, air, or water-tight, by means of metallic packing, and capable of being used in all situations where such pistons are commonly employed. These improved metallic pistons are composed of a top and bottom plate of metal, in the ordinary manner; between which, are a peculiar combination of annular springs, intended to constitute a perfect steam or air-tight packing, and which are brought into action by

means of screws, bearing both in the bed and top plate of the piston, in order to compress the system of springs, and thus, by bringing the top plate close upon the bed of the piston, cause the metallic packing to be brought into perfect contact with the interior of the cylinder in which the piston is employed.

In order to illustrate more particularly the construction of my improved metallic pistons, and to facilitate the description thereof, I have attached to these presents a sheet of drawings, in which my improved piston is exhibited complete and in detail, and having figures and letters of reference marked thereon; similar letters being placed upon corresponding parts of the apparatus in all the figures.

Fig. 1, Plate X., represents a plan or horizontal view of the piston, with the cover or top plate removed. Fig. 2, a complete side elevation, and fig. 3, a section taken vertically, through the middle of the same. The piston rod *a*, *a*, has the bottom plate or bed of the piston *b*, *b*, secured to its conical end by a cottar or key, in the usual manner; upon this bottom plate or bed, an angular spring ring *c*, *c*, is placed loosely, around which are placed two other spring rings *d*, *d*, and *e*, *e*; the upper ring *d*, being turned upon its interior surface to the same bevil as the upper side of the ring *c*; and the lower ring *e*, being also turned upon its interior surface to a corresponding angle, with the lower side of the spring ring *c*; thus, these two outer annular springs being accurately turned and ground to the plates *b* and *f*, form a perfect metallic packing, being pressed or kept against the interior surface of the cylinder, by the action of the annular spring *c*, *c*. The top plate *f*, *f*, is fixed upon the bed of the piston by means of the screws *g*, *g*, *g*; and thus, by enclosing the system of annular springs, keeps the whole apparatus together, and forms a perfect steam, air, or water-tight

packing. In order to keep the spring packing from being injured by the action of any steam that might otherwise get into the body of the piston, the ends of the springs are furnished with small segmental pieces *h*, *h*, being turned accurately to fit corresponding recesses in the springs *d* and *e*, which will entirely prevent the admission of steam into the packing or body of the piston.

Fig. 4, is a detached plan view of the main annular spring *c*, *c*, and fig. 5, is a side elevation of the same; in which it will be seen, that it is turned somewhat excentric, and has a series of openings or mortices cut in its angular periphery, in order to assimilate all points of the spring and impart an equal action throughout its circumference.

Figs. 6 and 7, are sectional representations of the upper and lower annular springs *d* and *e*, in order to shew that their interior circumference is turned to a corresponding bevil with each angle of the spring *c*, *c*; and fig. 8, is a plan view of the same.

Having now fully described the particular object of my invention, and the manner of carrying the same into practical operation, I desire it to be understood, that I claim as my invention, the peculiar mode of constructing metallic packing for pistons, and also their particular arrangement, as shewn in the various figures of the drawing attached to these presents; that is to say, the combination of three perfect annular springs, being compressed and brought into action in the manner and for the purposes above particularly described.—[*Inrolled in the Rolls Chapel Office, June* 1839.]

Specification drawn by Messrs. Newton and Berry.

To Thomas Horton, *of Princes End, in the parish of Tipton, in the county of Stafford, boiler and gasometer manufacturer, and* Thomas Smith, *of Horseley Heath, in the same parish and county, mine agent, for their invention of improvements in the making or constructing of chains for pits, shafts, mines, or other purposes.*— [Sealed 6th March, 1838.]

This invention consists in the application of flat wrought iron plates to chains used for mining and other purposes, in such way that the links of such chains are more securely connected and supported, as will be hereafter particularly described.

The flat iron chains, now ordinarily used for raising coals and other minerals from pits and mines, are of such a complicated construction that they are frequently out of order, and require to be repaired, occasioning thereby great loss and inconvenience; and moreover, the mode of connecting the links is such, that these chains are apt to break, occasioning, not unfrequently, loss of life, and at all times, creating distrust and fear in the miners and others using them. Our object is to introduce at once greater simplicity and more perfect security, and with this view, we make our chains in the following manner:—

We take solid wrought iron plates, of the form shewn in the drawing hereunto annexed, and therein described in Plate X., fig. 1,—in or through which, by chains of machinery, we punch or stamp six round or square holes, as shewn in such figure by the letters A, A, A; into these holes we insert or admit the links marked B, at fig. 2, which are formed of round, flat, or square rolled iron, strongly and accurately welded; and by this arrangement the use of rivets of any kind, which is the weak part of the flat chains now in use, is altogether avoided.

The size of the links, as described in the drawing, is in just proportion to the plate therein also described; but the dimensions of both may be varied as occasion may require, and so as to adapt them to the particular purpose to which the chain is to be applied. Fig. 3, is a stay C, formed of wood, placed between the links B, B, B, with small wrought iron stubbs, towards the extremities thereof, marked D, the use of which is to keep the said links firm in their position; fig. 4, gives a lateral or edge view of a portion of the chain as put together; and fig. 5, shews the flat part of a portion of the chain in a finished state. In all these figures, the same letters are used to denote the same parts.

It is to be understood that, although we have here shewn only three square holes or openings at each end of the flat wrought iron plates, for connecting the links of the chain together with stays of wood, and iron stubbs for keeping such links in their proper position,—we do not confine ourselves to this number, neither do we limit ourselves to the precise size or form of the plates, holes, links, or stays, shewn in the annexed drawing, or to any average weight per yard of such chains when completed, as variations in this respect may be made, effecting the object of our patent, without deviating from the principle of the invention. For instance, four links instead of three may be connected with such wrought iron plates, by an equal number of holes stamped or pressed through the said plates, in the manner hereinbefore described; or the holes may be round instead of square, and the links may be round instead of square, or flat rod or hammered iron,—or any other substance effectual as a stay, may be used in the place of the wooden stays shewn by fig. 3; at present, however, we prefer the chain as shewn entire at fig. 5, both as to construction and dimensions, apprehend-

ing that, thereby, lightness may be obtained with the requisite strength.

And we would have it understood, that we lay no claim to the rolling of the iron intended to be used either for such plates or links, nor to the shape or manner of preparing the stays, nor to any of the parts separately; but what we do lay claim to, as our invention, is the application of wrought iron plates with holes stamped there through, in any form, instead of rivets or welding to the links of flat chains, to be used either for pits, shafts, mines, or other purposes, whereby the links, with or without the aid of stays made of wood or other substance, may be firmly secured and kept in the proper position for forming a flat chain, whatever the number or form of the links, or of the holes into which they are inserted.—[*Inrolled in the Rolls Chapel Office, August* 1839.]

To Josiah Marshall Heath, *of Allan Terrace, Kensington, in the county of Middlesex, gentleman, for his invention of certain improvements in the manufacture of iron and steel.*—[Sealed 5th April, 1839.]

This invention consists, firstly, in the extraction of pure cast iron from certain ores of that metal, without the intervention of any earthy, alkaline, or saline matter, to form a vitreous flux, cinder, or slag; secondly, the formation of cast steel, by fusing the said pure cast iron along with malleable iron or certain metallic oxides, in such proportion as may decarburate the cast iron to a certain degree, and by completing the decarburation in a suitable cementing furnace; thirdly, the use of a certain portion of oxide of manganese in the process of converting cast iron into mal-

leable iron, by the process of puddling; and fourthly, the use of carburet of manganese in any process whereby iron is converted into cast steel.

And in further compliance with the said proviso, I, the said Josiah Marshall Heath, do declare the manner in which my said inventions are to be performed, by the following general explanations and particular details of the several processes.

Malleable iron is at present produced either by smelting the richer iron ores with just as much charcoal or other carbonaceous matter as shall be adequate to abstract all the oxygen from the ore, and bring it into the malleable state; or by smelting the ore in contact with carbonaceous matter in such excess as to form with the metal the compound, called carburet of iron, by chemists, and cast iron by manufacturers; and then to separate the carbon by a distinct and subsequent process.

The first of these methods is that practised upon the purer native oxides of iron in the Catalan forges of the Pyrenees, in the Stück ofen of Corinthia, and in the Bloomeries of India;—the second is that practised in the blast furnaces of Great Britain upon the argillaceous ores of iron.

By the first process, malleable or bar iron, of very unequal quality in its different parts, is produced;—by the second process, a cast iron is obtained, which is contaminated to a very considerable degree with sulphur, phosphorus, arsenic, silicon, aluminum, &c., and by both processes a very large proportion of the metal is wasted into cinder under the blast, as well as in the operations of puddling and re-heating the blooms.

A pure native oxide, or carbonate of iron, is alone capable of producing a pure metal convertible into good steel; but such pure ores have been hitherto debased and dete-

riorated in the smelting by mixture with earthy saline or alkaline matters, under the name of fluxes, added with the intention of promoting the reduction of the metal, and of protecting it when reduced from the oxidizing influence of the blast.

I have discovered, after an extensive course of experiments, that such earthy or other mixtures are not necessary towards the reduction of the pure native oxides and carbonates of iron, and this discovery constitutes my first invention under the present letters patent. This invention consists in smelting such pure ore without the formation of any vitreous flux, slag, or cinder, in manner as follows:—

I commence the operation by filling progressively my blast furnace with coke, charcoal, or other equivalent fuel, leaving the tap-hole open, that the flame of the fuel, urged by the blast, may play in all directions, downwards as well as upwards, so as to bring the whole interior of the furnace into a uniform state of incandescence; and whenever the furnace is thus filled with ignited fuel, I close the tap-hole, and immediately throw into the mouth of the furnace twenty pounds of ore for every hundred pounds of fuel, and I continue to charge the furnace at this rate until such time as it is calculated that three or four hundred weight of fluid iron are collected in the hearths, at which time I tap the furnace and run off the melted metal into pigs.

After this first discharge or casting, I begin to add the ore, at the rate of twenty-five pounds for every hundred pounds of fuel, and continue to charge the furnace at this rate during a period of twelve hours, at which time I tap and run off a second casting of pig iron. After this second discharge I add ore at the rate of thirty pounds for every hundred pounds of fuel, during the third working period of twelve hours; and thus, in each successive period of twelve hours, I increase the burthen of ore at the rate of five per

cent. of the weight of the fuel, till, eventually, the proportion of ore shall amount to about sixty-five or seventy pounds for every hundred pounds of fuel. By proceeding in this way, and by throwing in the ore, merely reduced to the size of peas, or thereabouts, but not roasted, I find that, if the furnace be well attended to by the workmen, it will turn out about fifty pounds of pure pig iron for every hundred pounds of fuel that are consumed.

I prefer to run the fused metal into iron moulds, because I have found that when it is run into sand, as is commonly practised by the iron smelters, it is apt to get covered with a coat of silicious matter, and is thereby contaminated and subject to waste in the subsequent process of conversion into malleable iron or steel; but I do not claim running the iron into iron moulds as any part of my invention.

Having by the said process obtained a pure cast metal, or a simple carburet of iron, uncontaminated with the sulphur, phosphorus, silicon, and other metalloids present in ordinary cast iron, I next proceed to convert that carburet into steel of any degree of hardness, which conversion I perform as follows:—I first melt the said cast iron in a cupola furnace, by the heat of coke, as free from sulphur as possible; or by mixture of such coke and anthracite, or in certain localities by wood charcoal. But in all cases I use no more fuel than is merely requisite to melt the iron, so that the oxygen of the blast shall serve to burn away the carbon of the carburet in a considerable degree; while I neutralize or remove a further portion of the carbon by the addition of scraps of metallic iron, or by the oxides of iron or of manganese, always taking care not to decarburate the metal to such a degree as to render it infusible, but to leave about as much carbon in it as exists in cast steel.

For the purpose of producing a superior article of cast

To STAINFORD, Thomas, of the Grove, Great Guildford Street, Southwark, Smith and Engineer, and Lyne, George Henry, of John Street, Blackfriars Road, Machanist and Engineer, for their invention of certain improvements in machinery for making bricks Sealed 23d Aug. 1825.
No. 86, Vol. XIV, page 177.

— STANLEY, John, of Chorlton Row, Manchester, in the County of Lancaster, Smith, for certain machinery, calculated for a more efficacious mode of fuelling or supplying of furnaces in general with fuel, whereby a considerable reduction in the consumption of fuel, the appearance of smoke, and of labour is effected. Sealed 27th July, 1822. No. 37, Vol. VII, page 17.

— STANSFELD, Thomas Wolrich, of Leeds, in the County of York, Worsted Manufacturer, Briggs, Henry, of Luddenfoot, in the Parish of Halifax, in the said County, Worsted Manufacturer, Pritchard, William, of Leeds, aforesaid, Engineer, and Barraclough, William, of Burley, in the Parish of Leeds, aforesaid, for their inventions of certain improvements in the construction of looms for weaving fabrics composed wholly, or in part of woollen, worsted, cotton, linen, silk, or other materials, and in the machinery and implements for, and methods of working the same. Sealed 5th July, 1823.
No. 51, Vol. IX, page 173.

———————— for his invention of certain improvements in power looms, and in the preparation of warps for the same Sealed 27th July, 1824. No. 65, Vol. XI, page 113.

———————— Pritchard, William, Civil Engineer, and Wilkinson, Samuel, Merchant, all of Leeds, in the County of York, for their new invented improvements in looms, and in implements connected therewith Sealed 16th July, 1825. No. 84, Vol. XIV, page 73.

— STEELE, Thomas, of Magdalen College, Cambridge, Esq. for his invention of certain improvements in the construction of diving bells, or apparatus for diving under water. Sealed 28th Oct. 1826. No. 67, Vol. XI, page 239.

— STEIN, Robert, of Walcot Place, Lambeth, in the County of Surrey, for certain improvements in steam engines. Sealed 20th Feb. 1821.
No. 12, Vol. II, page 411.

— STEINHAUSER, John Leiberecht, of Moffat Terrace, City Road, London, for an improvement on portable lanterns and lamps. Sealed 15th Jan. 1820.
No. 2, Vol. I, page 98.

— STEPHENSON, George, of Long Benton, Northumberland, Engineer, for certain improvements in steam engines. Sealed 21st March, 1822.
No. 36, Vol. VI, page 288.

— STEPHENSON, Robert, of Bridge Town, in the Parish of Old Stratford, in the County of Warwick, Engineer, for his invention of axletrees to remedy the extra friction on curves to waggons, carts, cars, and carriage uses, or to be used on railroads, tramways, and other public roads. Sealed 23d Jan. 1826.
No. 66, Vol. XI, page 169.

— STRATTON, George, of Hampstead Road, in the County of Middlesex, Engineer, for his invention of an improved process of consuming smoke. Sealed 2d March, 1822. No. 28, Vol. V, page 174.

— STRUTT, Anthony Radford, of Makeney, Derbyshire, for certain improvements in the construction of locks and latches. Sealed 18th Oct. 1819.
No. 2, Vol. I, page 88.

— STYLES, William, of Islington, in the County of Middlesex, Gentleman, for an invention of improvements in machinery for sifting cinders, and disengaging the cinders so sifted into a convenient receptacle, which machinery is also applicable to other useful purposes. Sealed 12th Nov. 1818.
No. 1, Vol. I, page 26.

To SUNDERLAND, Thomas, of Cromshill Cottage, Blackheath, in the County of Kent, Esq. for his invention of a new combination of fuel. Sealed 20th April, 1825. No. 60, Vol. X, page 258.

— SURRY, James, of Battersea, in the County of Surrey, Miller, for his invention of a new method of applying heat for the producing of steam, and for various other purposes, whereby the expense of fuel will be lessened. Sealed 4th Sept. 1823. No. 43, Vol. VIII, page 16.

— SUTTILL, William, of Old Brompton, in the County of Middlesex, Flax Spinner, and Lamb, Alexander, of Princes Street next the Bank, in the City of London, Gentleman, for their invention of certain improvements in machinery for preparing, drawing, roving, and spinning flax, hemp, and waste silk. Sealed 17th Nov. 1825. No. 89, Vol. XIV, page 355.

— SUWERKROP, John Hillary, of Vine Street, Minories, in the City of London, Merchant, in consequence of a communication made to him by a certain foreigner residing abroad, for an apparatus or machine, which he denominates a thermophore or portable mineral, or river water bath and linen warmer; and also for other apparatus or machinery connected therewith, for filtering and heating water. Sealed 4th Dec. 1824.
No. 68, Vol. XI, page 304.

— SWAINE, Edward Schmidt, of Bucklersbury, in the City of London, in consequence of a communication made to him by Frederick Adolphus Augustus Streeve, of the City of Dresden, Doctor of Physic, and Edward Swaine, of the City of Leipsic, Merchant, for an invention of a method of producing and preserving artificial mineral waters, and for machinery to effect the same. Sealed 9th Oct. 1823. No. 54, Vol. IX, page 347.

— SYMES, Edward Bowles, of Lincoln's Inn, Middlesex, Esq. for the invention of an expanding hydrostatic piston to resist the pressure of certain fluids, and to slide easily in an imperfect cylinder. Sealed 10th Nov. 1821.
No 26, Vol. V, page 78.

— TABOR, James Ashwell, of Jewin Street, Cripplegate, in the City of London, Gentleman, for his having invented or found out means for indicating the depth of water in ships and vessels. Sealed 14th Dec. 1825.
No. 82, Vol. XIII, page 333.

— TARLTON, Gilbert, Andrew, Jonathan, and Shepley, Joseph, all of Crumpsale, near Manchester, in the County Palatine of Lancaster, Cotton Spinners, for their invention of certain improvements in the construction of a machine used for throstle and water spinning of thread or yarn, whether the said thread or yarn be fabricated from cotton, flax, silk, wool, or any other fibrous substances, or mixture of substances, whatever; and is also applicable to the purpose of preparing a roving for the same. Sealed 11th Jan. 1825. No. 76, Vol. XII, page 354.

— TAYLOR, William, of Wednesbury, Staffordshire, for his invention of an improved furnace for the smelting of iron and other ores. Sealed 23d Oct. 1820. No. 9, Vol. II, page 187.

— TAYLOR, James, Esq. of Lloyd's Coffee House, City of London, for a new method of constructing the bottom of merchant ships, and placing the pumps so as to prevent damage to the cargoes by bilge-water. Sealed 16th Jan. 1823. No. 27, Vol. V, page 132.

— TAYLOR, Joseph, of Manchester, in the County Palatine of Lancaster, Machine Maker, for certain improved machinery or apparatus to facilitate or improve the operation of spinning, doubling and throwing, silk, cotton, wool, or flax, or mixtures of the said substances. Sealed 29th April, 1823.
No. 48, Vol. VIII, page 288.

— TAYLOR, Phillip, of the City Road, in the County of Middelsex, Engineer, for his invention of certain improvments in apparatus for producing gas from various substances. Sealed 15th June, 1824. No. 60, Vol. X, page 231.

To TAHLOR, Phillip, for his invention of certain improvements in making iron. Sealed 18th Aug. 1825. No. 82, Vol. XIII, page 331.

——————— for his invention of certain improvements in steam engines. Sealed 3d July, 1824. No. 62, Vol. X, page 367.

— TAYLOR, Isaac, jun. of Chipping Ongar, in the County of Essex, Gentleman, for his new invented cock or tap for drawing off liquids. Sealed 20th Nov. 1823. No. 63, Vol. XI, page 17.

— TAYLOR, Joseph Alexander, of Great St. Helen's, in the City of London, Gentleman, for his invention of a new polishing apparatus, for household purposes. Sealed 15th Aug. 1825. No. 83, Vol. XIV, page 20.

— TEISSIER, Simeon, of Paris, but at present reisding in Bucklersbury, London, for certain improvements in propelling vessels, communicated to him by a foreigner residing abroad. Sealed 3d June, 1820. No. 5, Vol. I, page 338.

— TEISSIER, Jean Antoine, of Tottenham Court Road, in the County of Middlesex, Gentleman, in consequence of a communication made to him by a certain foreigner, for certain improvements in steam engines. Sealed 15th Sept. 1825. No. 81, Vol. XIII, page 247.

— TETLOW, James, of Manchester, in the County Palatine of Lancaster, Weaver, for his invention of certain improvements in power looms for weaving various articles. Sealed 14th Oct. 1824. No. 67, Vol. XI, page 254.

— THACKRAH, Joseph, of Leeds, Surgical Machinist, and Greenwood, Thomas, of Gilderson, near Leeds, both in the County of York, Machine Makers, for their invention of certain improvements on or substitutes for pattens and clogs. Sealed 27th Dec. 1823. No. 40, Vol. VII, page 177.

— THIN, John, of the City of Edinburgh, Architect, for his invention of a new method of constructing a roasting jack. Sealed 1st Feb. 1825. No. 78, Vol. XIII, page 84.

— THOM, James, of Wells Street, and Allen, William, of Castle Street, both in St. Marylebone, for an invention of a certain improvement in pianofortes. Sealed 15th Jan. 1820. No. 3, Vol. I, page 184.

— THOMAS, William, and Lobb, Joseph, of Sithney, Cornwall, for a machine or instrument for cutting and preparing lay or lea ground for tillage, at much less expense, and in a shorter space of time, than is required by the present mode of ploughing; and also for renewing grass land, lay or lea ground, with seeds, without destroying or tearing up the whole surface thereof. Sealed 1st May, 1821. No. 10, Vol. II, page 250.

— THOMASON, Henry Botfield, of Birmingham, Warwickshire, for certain improvements in the making and manufacturing cutlery, viz. that species of cutlery called or styled table knives, dessert knives, fruit knives, pocket knives, scissors, razors, and surgical instruments. Sealed 20th July, 1820. No. 9, Vol. II, page 184.

— THOMASON, Edward, of Birmingham, in the County of Warwick, Goldsmith and Silversmith, for his having found out or invented improvements in the construction of medals, tokens, and coins. Sealed 9th Nov. 1826. No. 89, Vol. XIV, page 373.

— THOMPSON, Benjamin, of Ayton Cottage, Durham, for his method of facilitating the conveyance of carriages along iron and wood railways, tramways, and other roads. Sealed 24th Oct. 1821. No. 14, Vol. III, page 65.

— THOMPSON, John, of Regent Street, St. James's, for a certain improvement in the method of forming or preparing steel for the manufacture of springs for carriages, but principally applicable to all those denominated coach springs. Sealed 2d March. 1822. No. 22. Vol. IV. page 181.

To THOMPSON, John, of Pembroke Place, Pimlico, and of London Steel Works Thames, Bank, Chelsea, for his improved mode of making refined, or what is commonly called cast steel. Sealed 9th Dec. 1824.
No. 57, Vol. X, page 75.

——— and Barr, John, of Hales Owen, near Birmingham, Warwickshire, Engineer, for their having invented and brought to perfection certain improvements in producing steam, applicable to steam engines or other purposes. Sealed 21st June, 1825. No. 70, Vol. XII, page 32.

— THOMPSON, John Thomas, of Long Acre, in the Parish of St. Martin in the Fields, and County of Middlesex, Camp Equipage Maker, for his invention of certain improvements in making or manufacturing metallic tubes, whereby strength and lightness are obtained, and for applying them, with various other improvements, in the construction of the metallic tube and other bedsteads. Sealed 17th Aug. 1826. No. 88, Vol. XIV, page 328.

— THOMSON, Sarah, of Rotherhithe, for an invention of new or improved machinery, and the further application of known principles by new combinations, for the purpose of cutting cork first into slips, then into squares, and afterwards in rounding the same; communicated to her by her late husband, Archibald Thomson, and her late son, Archibald Thomson. Sealed 15th May, 1819. No. 1, Vol. I, page 28.

— TICKELL, John Ambrose, of West Bromwich, in the County of Stafford, Gentleman, for a cement to be used in equatic and other buildings, and stucco work, which is produced by the use and application of a mineral substance never before employed in the manufacture thereof. Sealed 9th May, 1820.
No. 4, Vol. I, page 266.

— TIMBRELL, Andrew, of the Old South Sea House, London, for an improvement in the rudder and steerage of a ship or vessel. Sealed 22d Dec. 1820. No. 9, Vol. II, page 175.

— TODD, Thomas, of Swansea, South Wales, organ builder, for his invention of an improvement in producing tone upon musical instruments of various descriptions. Sealed 22d Nov. 1823. No. 55, Vol. IX, page 404.

— TOMLINSON, Richard Jones, of Bristol, for an invention of an improved rafter for roofs or beams, and for other purposes. Sealed 3d May, 1821.
No. 21, Vol. IV, page 124.

——— for his invention of an improved frame work for bedsteads, and other purposes. Sealed 26th Nov. 1825.
No. 82, Vol. XIII. page 322.

TOMPSON, George, of Wolverhampton, in the County of Stafford, Gentleman, for his invention of improvements in the construction of riding saddles. Sealed 28th June, 1827. No. 82, Vol. XIII, page 321.

TONGE, Daniel, of Liverpool, in the County Palatine of Lancaster, Ship-owner, for his new invented apparatus, by means of which an improved method of reefing sails is effected. Sealed 15th April, 1824.
No. 53, Vol. IX, page 303.

TOREY, William Swift, of Deeping St. James's, Lincoln, for certain improvements on drills to be affixed to ploughs. Sealed 1st Nov. 1820.
No. 7, Vol. II, page 16.

TREADWELL, Daniel, late of the United States of America, but now resident in London, for certain improvements in the construction of printing presses. Sealed 25th Jan. 1820. No. 5, Vol. I, page 321.

TRITTON, Henry, Esq. of Battersea, for the invention of an improved apparatus for filtration. Sealed 11th August, 1819.
No. 2, Vol. II, page 84.

——— for a new method of producing rotatory motion. Sealed 4th Dec. 1819. No. IV, Vol. I, page 280.

To TUELY, Charles, sen. of Kenton Street, Brunswick Square, London, cabinet-maker, for certain improvements applicable to window sashes; either single or double hung, fixed, sliding sashes, casements, window shutters, and window blinds. Sealed 1st Nov. 1821. No. 34, Vol. VI, page 183.

TULLOCK, James, of Savage Gardens, in the City of London, Gentleman, for his invention and discovery of an improvement or improvements in the machinery to be employed for sawing and grooving marble and other stone; or in producing grooves or mouldings thereon. Sealed 12th April, 1824. No. 62, Vol. X, page 259.

TURNER, John, of Birmingham, in the County of Warwick, Brass and Iron Founder, for his invention of a machine for crimping, pleating and goffering linens, muslins, frills, and other articles. Sealed 27th April, 1824. No.52, Vol. IX, page 251.

TURNER, Miles, and Angell, Lawrence, of Whitehaven, in the County of Cumberland, Soap Boilers, for their invention of an improved process to be used in the bleaching of linen, cotton, yarn, or cloth. Sealed 24th July, 1823. No. 41, Vol. VII, page 241.

TURNER, William, of Winslow, in the County of Chester, Saddler (being one of the people called Quakers), and William Mosedale, of Park-street, Grosvenor Square, in the County of Middlesex, Coach Maker, for their new invented improvements on collars for draught horses. Sealed 2d April, 1825. No. 59, Vol. X, page 196.

TURNER, James, of Wells-Street, Marylebone, in the County of Middlesex, Carpenter and Builder, and Bond, John Linnel, of Newman Street, in the parish of St. Marylebone aforesaid, Architect, for their invention of certain improvements in the construction of window casements, folding sashes, and doors, by means of which the same are hung and hinged in a manner adapted more effectually to exclude rain and wind, and to afford a free circulation of air. Sealed 9th March, 1825. No. 72, Vol. XII, page 134.

TYERS, Robert John, of Piccadilly, Middlesex, Fruiterer, for a machine or apparatus to be attached to boots, shoes, or other coverings for the feet, for the purpose of travelling at pleasure. Sealed 22d April, 1823. No. 37, Vol. VII, page 20.

— ULRICH, John Gottlieb, late of Bucklersbury, Cheapside, in the City of London, but now of Upper Rosamond Street, in the Parish of St. James's, Clerkenwell, in the County of Middlesex, Chronometer Maker, for his invention of certain improvements in chronometers. Sealed 25th March, 1825. No. 79, Vol. XIII, page 122.

— VAN HEYTHUSEN, Friderich Miguel, of Sidmouth Street, St. Pancras, Middlesex, Esq. for a method of making portable machinery or instruments to be placed upon a desk or table, and so contrived as to fold or not into a small compass made of wood, brass, or other metal, to support a silken shade for the purpose of protecting the eyes from a strong light. Sealed 18th March, 1820. No. 4, Vol. I, page 277.

———————————— of Chancery Lane, London, for a new method of propelling small vessels or boats through water, and light carriages over land. Sealed 23d July, 1821. No. 15, Vol. III, page 124.

— VALLANCE, John, of Brighton, Sussex, for a method and apparatus for freeing rooms and buildings, whether public or private, from the distressing heat sometimes experienced in them; and of keeping them constantly cool and of a pleasant temperature, whether they are crowded to excess or empty, and also whether the weather be hot or cold. Sealed 20th June, 1820. No. 7, Vol. II, page 26.

———————— for improvements on a Patent granted to him in June, 1820, for a method and apparatus for freeing rooms and other buildings,

whether public or private, from the distressing heat sometimes experienced in them. Sealed 19th June, 1821. No. 18, Vol. III, page 292.

To VALLANCE, John, for his invention of an improved method of freezing water. Sealed 1st Jan. 1824. No. 47, Vol. VIII, page 251.

——————— for his new invented method of communication, or means of intercourse, by which persons may be conveyed, goods transported, or intelligence communicated from one place to another, with greater expedition than by means of steam carriages or other vessels, or carriages drawn by animals. Sealed 19th Feb. 1824. No. 58, Vol. X, page 113.

——————— for his invention of an improved method or methods of abstracting or carrying off the caloric of fluidity from any congealing water (or it may be other liquors;) also an improved method or methods of producing intense cold; also an improved method of applying this invention, so as to make it available to purposes, with reference to which temperature above or below the freezing point, may be rendered productive of advantageous effects, whether medical, chemical, or mechanical. Sealed 28th Aug. 1824. No. 68, Vol. XI. page 298.

— VAUGHAN, George, of Sheffield, Yorkshire, Gentleman, for his blowing machine, on a new construction, for the fusing and heating of metals, smelting ores, and supplying blasts for various other purposes. Sealed 14th Dec. 1820. No. 10, Vol. II, page 261.

——————— for his invention of an improvement or improvements on steam engines, by which means power will be gained and expense saved. Sealed 1st May, 1824. No. 61, Vol. X, page 287.

— VAZIE, Robert, of Chasewater Mine, in the Parish of Kenwyn, in the County of Cornwall, Civil Engineer, for an improvement in the compounding of different species of metals. Sealed 3d Sept. 1822. No. 28, Vol. V, page 175.

— VERE, William, of Crown Row, Mile End Old Town, in the Parish of Stepney, and County of Middlesex, Engineer, and Crane, Henry Samuel, of Stratford, in the Parish of West Ham, in the County of Essex, Manufacturing Chemist, for their invention of certain improvements in the manufacture of inflammable gas. Sealed 30th June, 1823. No. 40, Vol. VII, page 175.

— VINEY, James, of Shanklin, in the Isle of Wight, Colonel in the Royal Artillery, for his invention of certain improvements in and additions to water closets. Sealed 6th May, 1824. No. 58, Vol. X, page 140.

——————— for his new invented method of supplying water or fluids for domestic or other purposes, in a manner more extensively and economically than has hitherto been usually practised. Sealed 22d May, 1824. No. 61, Vol. X, page 297.

— VIZARD, George, of Dursley, for a new process or method of dressing and polishing goods of woollen manufacture. Sealed 3d Feb. 1821. No. 9, Vol. II, page 170.

— WAKEFIELD, John, of Anscott's Place, Manchester, for certain improvements in the construction of furnaces for boilers of various descriptions, and in the mode of feeding the same with fuel, which improvements are calculated to lessen the consumption of fuel, and to burn the smoke. Sealed 6th June, 1820. No. 9, Vol. II, page 167.

— WALKER, William, of New Grove, Mile End Road, in the Parish of St Dunstan, Stepney, and Charleton, George, of Maidenhead Court, in the Parish of St. John, Wapping, both in the County of Middlesex, Master Mariners, for their invention of certain improvements in the building or constructing of ships or other vessels. Sealed 10th Aug. 1825. No. 81, Vol. XIII, page 257.

To WALL, Edward, of Minchinhampton, Gloucestershire, Gent., for the invention of certain improvements in stage coaches, and other descriptions of carriages. Sealed 18th May, 1819. No. 1, Vol. I, page 14.

— WALLER, Thomas, of Luton, in the County of Bedford, Straw Hat Manufacturer, for his invention of certain improvements in the manufacture of straw plait, for the purpose of making bonnets, hats, and other articles. Sealed 18th Feb. 1826. No. 71, Vol. XII, page 66.

— WARCUP, William, of Dartford, Kent, Engineer, for his improvements upon a machine for washing linen cloths, cotton cloths, or woollen cloths, whether in the shape of piece goods, or any other article made up of linen cloth, cotton cloth, or woollen cloth. Sealed 10th Dec. 1821. No. 27, Vol. V, page 117.

———————— for an improvement or improvements in the construction of a machine called a mangle. Sealed 3d April, 1823. No. 48, Vol. VIII, page 281.

— WARD, John, of Grove Road, Mile End Road, in the County of Middlesex, Iron Founder, for his invention of certain improvements in the construction of locks and other fastenings. Sealed 13th Nov. 1823. No. 48, Vol. VIII. page 303.

— WARNUM, Robert, of Wigmore Street, Cavendish Square, in the County of Middlesex, Piano Fort Maker, for his invention of certain improvements in piano fortes. Sealed 4th July, 1826. No. 89, Vol. XIV, page 358.

— WASS, Joseph, of Lea Wharf, Ashover, in the County of Derby, for an improvement which prevents the ill effects to vegetative and animal life, that have hitherto been occasioned by the noxious fumes and particles which arise from smelting or calcining lead ore, and other pernicious minerals. Sealed 15th June, 1822. No. 23, Vol. IV, page 225.

— WATTS, Richard, of Crown Court, Temple Bar, London, for improvements in inking printing types with rollers, and in placing and conveying paper on types, and in inking with a cylinder. Sealed 15th May, 1820. No. 10, Vol. II, page 263.

— WEATHERSEY, Henry Oswald, of Queen Ann Street, in the Parish of St. Marylebone, in the County of Middlesex, for his invention of certain apparatus or machinery, for the purpose of splitting, rending asunder, cutting or cleaving of wood, and forming and securing the same in bundles. Sealed 14th May, 1825. No. 79, Vol. XIII, page 128.

— WEBSTER, William, late of George Court, Princes Street, Soho, and of Regent Street, St. James's, London, for certain improvements in the mechanism of, and appertaining to, Forsythe's roller magazine, and for the discharge of fowling pieces and fire arms in general, by means of *percussion*. Sealed 14th Sept. 1821. No. 14, Vol. III, page 72.

— WELLS, Joseph, of Manchester, in the County Palatine of Lancaster, Silk and Cotton Manufacturer, for his new invented machine for dressing and stiffening, and dyeing of cotton and linen warps, or any other warps, that may require it, at the same time the loom is working, either with the motion of the loom or any other machinery. Sealed 25th May, 1824. No. 52, Vol. IX, page 241.

— WEISE, William, Phillip, of Tooly Street, Southwark, in the County of Surrey, Manufacturer, for his invention of certain improvements in the preparing and making water proof cloth and other materials for the manufacturing of hats, bonnets, and caps, and wearing apparel, and in manufacturing the same therefrom. Sealed 14th Oct. 1824. No. 63, Vol. XI, page 21.

— WEISS, John, of the Strand, in the County of Middlesex, Surgical Instrument Maker and Cutler, for his invention of certain improvements on exhausting, injecting, or condensing pumps, and on the apparatus con-

nected therewith, and which said improvements are applicable to various useful purposes. Sealed 18th Dec. 1824. No. 67, Vol. XI, page 247.

To WHEATSTONE, William, of Jermyn Street, St. James's, in the County of Middlesex, Music Seller, for his invention of a method of improving and augmenting the tones of piano fortes, organs, euphonous, and other musical instruments. Sealed 29th July, 1824.
No. 53, Vol. IX, page 307.

— WHITCHER, John, of Helmet Row, Old Street, St. Luke's, in the County of Middlesex, Mechanic, Matthew Pickford, of Wood Street, in the City of London, Common Carrier, and James Whitburn, of Goswell Street, in the aforesaid County, Coach Smith, for an invention of an improvement in the construction of the wheels of all wheeled carriages, and of all other vertical wheels of a certain size. Sealed 27th Sept. 1822.
No. 25, Vol. V, page 6.

— WHITE, James, of Manchester, for certain new machinery, adapted to preparing and spinning wool, cotton, and other fibrous substances, and uniting several threads into one; and also certain combinations of the said new machinery with other machines already known and in use. Sealed 11th July, 1820. No. 9, Vol. II, page 176.

— WHITE, John, of New Bond Street, in the Parish of St. Marylebone, in the County of Middlesex, Architect, for his new invented floating breakwater. Sealed 15th Jan. 1824. No. 41, Vol. VII, page 232.

— WHITE, John, the younger, and Thomas Sowerby, both of Bishops Wearmouth, in the County of Durham, Merchants, for their new invented improved air furnace, for the purpose of melting or fusing metallic substances. Sealed 6th Nov. 1824. No. 57, Vol. X, page 69.

— WHITE, William, of Cheapside, in the City of London, and William Mayhew, of Union Street, Southwark, in the County of Surry, Hat Manufacturers, for their new invented improvement in ihe manufacture of hats. Sealed 7th Feb. 1826. No. 75, Vol. XII, page 308.

— WHITECHURCH, Richard and Whitechurch, John, of Star Yard, Carey Street, Chancery Lane, in the County of Middlesex, Carpenters and Joiners, for their having invented or found out an improvement upon hinges (which hinges may be made of iron, steel, brass, or other metals), for doors, cupboards, and sashes of houses, and are also applicable to all purposes where hinges are used, and particularly to the doors and windows of ships, vessels, steam boats, and other craft. Sealed 17th March, 1825.
No. 59, Vol. X, page 199.

— WHITEHOUSE, Cornelius, of Wednesbury, in the County of Stafford, Whitesmith, for his invention of certain improvements in manufacturing tubes for gas and other purposes. Sealed 26th February, 1825.
No. 60, Vol. X, page 254.

— WHITLAW, Charles, of Bayswater Terrace, Paddington, in the County of Middlesex, Medical Botanist, for his invention of an improvement or improvements in administering medicines by the agency of steam or vapour. Sealed 18th Feb. 1826. No. 88, Vol XIV, page 330.

— WICKHAM, Thomas, of the Town and County of the Town of Nottingham, Lace Manufacturer, for a compound paste or liquid, to be used for the purpose of improving and colouring lace and net, and all other manufactured articles made of flax, cotton, wool, silk, or any other animal or vegetable substances. Sealed 24th March, 1823. No. 33, Vol. VI, page 124.

— WIGSTON, William, of the Town of Derby, in the County of Derby, Engineer, for his invention of certain improvements on steam engines. Sealed 11th August, 1823. No. 46, Vol. VIII, page 176.

— WILKINSON, Charles, Hanning, M. D. of Bath, Somerset, and Gibbons, Bevington, of Melin Crythen Works, near Neath, Glamorganshire, for an

To WILKINSON, Samuel, Mechanic, Hirst, William, Hirst, Henry, and Heycock, William, Woollen Cloth Manufacturers, all of Leeds, in the County of York, for their invention of a certain apparatus for preventing coaches, carriages, mails, and other vehicles from overturning. Sealed 11th Aug. 1825. No. 67, Vol. XI, page 234.

WILKINSON, Samuel, Merchant, Stansfield, Thomas Wolrich, Merchant, and William Pritchard, Civil Engineer, all of Leeds, in the County of York, for their new invented improvements in looms and implements connected therewith. Sealed 16th July, 1825. No. 84, Vol. XIV, page 73.

WILKS, Matthew, of Dartford, Kent, Seed Crusher, for his method of refining oil produced from seed. Sealed 20th Dec. 1822. No. 41, Vol. VII, page 239.

WILKS, James, of Rochdale, in the County Palatine of Lancaster, Tin Plate Worker, and Ecroyd, John, of the same place, Grocer and Tallow Chandler, for their invention of an engine for cutting nails, sprigs and sparables on an improved system. Sealed 8th Nov. 1825. No. 87, Vol. XIV, page 250.

WILLAN, Peter, of Leeds, and Ogle, James, of Holbech, both in the County of York, Cloth Manufacturers, for their invention of certain improvements in fulling mills, or machinery for fulling and washing cloths, and such other fabrics as may require the process of felting or fulling. Sealed 20th Aug. 1825. No, 84, Vol. XIV, page 84.

WILLIAMS, John, of Cornhill, in the City of London, Stationer, for a method to prevent the frequent removal of the pavement and carriage paths, for laying down and taking up pipes, and for other purposes, in streets, roads, and public ways. Sealed 18th Oct. 1822: No. 25, Vol. V, page 9.

WILLIAMS, Thomas Robinson, of Norfolk Street, Strand, in the County of Middlesex, being one of the people called Quakers, for his invention of an improved lancet. Sealed 16th July, 1825. No. 72, Vol. XII, page 144.

———— for his invention or discovery of a machine for separating burs or other substances from wool hair or fur Sealed 18th Sept. 1826. No. 76, Vol. XII, page 337.

———— for his invention or discovery of an improved method of manufacturing of hats and caps with the assistance of machinery. Sealed 18th Sept. 1826. No. 84, Vol. XIV. page 65.

WILLIAMS, John, of the Commercial Road, in the County of Middlesex, Ironmonger and Ship's Fire Hearth Manufacturer, for his invention of certain improvements on ship's hearths, and apparatus for cooking by steam. Sealed 27th April, 1826. No. 89, Vol. XIV, page 359.

WILLOUGHBY, Moncreiffe, of Fair Street, Horsleydown, in the County of Surrey, Gentleman, for certain improvements in the construction of vessels, so as to enable them to sail with great velocity. Sealed 26th June, 1823. No. 40, Vol. VII, page 193.

WILSON, Stephen, Esq. of Streatham, Surrey, in consequence of discoveries by himself, and communications made to him by foreigners residing abroad, for certain improvements in machinery for weaving figured goods. Sealed 8th May, 1821. No. 10, Vol. II. page 255.

———— for a new manufacture of worsted. Sealed 18th Oct. 1822. No. 33, Vol. VI, page 126.

———— in consequence of his own discoveries, and communications made to him by foreigners residing abroad, for certain improvements in machinery for weaving and winding. Sealed 21st May, 1823. No. 43, Vol. VIII, pages 1 and 61.

To WILSON, Stephen, Esq. of Streatham, Surrey, in consequence of communications made to him by foreigners residing abroad, for certain improvements in machinery for making velvet and other cut-works. Sealed 7th October, 1824. No. 65, Vol. XI, page 129.

———— in consequence of communications made to him by certain foreigners residing abroad, for a new manufacture of stuffs with transparent and coloured figures, which he calls Diaphane stuffs. Sealed 25th Nov. 1824. No. 69, Vol. XI, page 313.

WILSON, Jacob of Welbeck-Street, in the Parish of St. Mary-le-bone, in the County of Middlesex, Upholsterer, and Barron, James, of Wells-Street, in the same Parish, Venetian Blind Manufacturer, for their invention of certain improvements in the construction and manufacturing of window blinds. Sealed 11th August, 1823. No. 43, Vol. VIII, page 11.

WILSON, John Hewitson, of Manchester, in the County of Lancaster, Silk and Cotton Manufacturer, and Gillman, Joseph, of Newgate-Street, in the City of London, Silk Warehouseman, for their invention of certain improvements in the manufacture of hats and bonnets. Sealed 18th Nov. 1823. No. 44, Vol. VIII, page 67.

WINCH, Robert, of Steward's Buildings, Battersea Fields, in the County of Surrey, Engineer, for his invention of certain improvements in or additions to rotatory pumps, for raising or forcing water and other liquids. Sealed 5th March, 1825. No. 73, Vol. XII, page 173.

WINCH, Robert, of Shoe Lane, London, for certain improvements on machines or presses chiefly applicable to printing. Sealed 18th May, 1820. No. 7, Vol. II, page 25

WINTER, John, of Acton, in the County of Middlesex, Esq. for certain improvements in chimney caps, and the application thereof. Sealed 7th Nov 1820. No. 7, Vol. II, page 8.

WINTER, James, of Stoke-under-Hamdon, in the County of Somerset, for certain improvements in a machine for sewing and pointing leather gloves with neatness and strength, much superior to that which is effected by manual power. Sealed 19th Dec. 1821. No. 19, Vol IV, page 12.

WINTER, Robert, of Fox Court, in the City of London, Esq. for an improved method of conducting the process of distillation. Sealed 22d April, 1823. No. 48, Vol. VIII, page 301.

WITFIELD, William, of Birmingham, for his invention of certain improvements in making or manufacturing of handles for sauce pans kettles and other culinary vessels, and also tea kettle handles, straps and other articles.—Sealed 19th Jan. 1826. No. 83, Vol. XIV, page 37.

WITTY, Richard, of Sculcoats, in the County of York, Civil Engineer, for certain improvements in pumps of various constructions for raising and conveying water and other liquids; and also methods of applying a certain principle or certain principles to ships' pumps, and for other useful purposes. Sealed 16th Oct. 1820. No. 10, Vol. II, page 245.

———— for his new invented improvements in the method of lighting by gas, by reducing the expense thereof. Sealed 25th March, 1825. No. 77, Vol. XIII, page 23.

———— for his invention of an improved chimney for argand and other burners. Sealed 30th July, 1825. No. 81, Vol. XIII, page 270.

WOLLASTON, Henry Septimus Hyde, of Clapton, in the County of Middlesex, Merchant, for a bolt or fastening particularly applicable to a night bolt. Sealed 4th June, 1822. No. 29, Vol. V, page 245.

To WOOD, James, of New Compton Street, St. Giles's in the Fields, for an invention of an improvement in the formation and position of the long keys B. natural and C. sharp, used upon the musical instrument called the clarionet, for the more easily fingering of the same. Sealed 18th Dec. 1819.
No. 3, Vol. I, page 183.

WOOD, John, and Hirst William, both of Leeds, in the County of York, manufacturers, for their invention of certain improvements in cleaning, milling, or fulling cloth. Sealed 5th March, 1825.
No. 67, Vol. XI, page 244.

—————————— for their invention of certain improvements in machinery for raising or dressing of cloth. Sealed 7th July, 1824.
No. 68, Vol. XI, page 281.

—————————— and Rogerson, John, Millwright, for their invention of certain improvements in machinery for raising and dressing cloth. Sealed 1st October, 1825. No. 68, Vol. XI, page 282.

WOOD, William, of Summer Hill Grove, in the County of Northumberland, Gentleman, for his invention of an apparatus for destroying the inflammable air (which is commonly known by the name of fire damp) in mines.—Sealed 22d April, 1826. No. 84, Vol. XIV, page 94.

WOODMAN, William, of York Barracks, Veterinary Surgeon of the Second Dragoon Guards, for his invention of an improved horse's shoe, which he denominates the bevelled-heeled expanding shoe. Sealed 11th Sept. 1823.
No. 43, Vol. VIII, page 14.

WOOLLAMS, Joseph, of Wells, Somersetshire, for certain improvements in the teeth or cogs formed on, or applied to wheels, pinions, or other mechanical agents for communicating or returning motion. Sealed 20th June, 1820.
No. 8, Vol. II, page 105.

—————————— for certain improvements in wheeled carriages of various descriptions to counteract the falling, and facilitate the labour of animals attached to them, and to render persons and property in and near them more secure from injury. Sealed 5th Dec. 1822.
No. 38, Vol. VII, page 76.

WORNUM, John, of Wigmore Street, Cavendish Square, London, for an improvement on piano fortes and certain other stringed instruments. Sealed 13th May, 1820. No. 5, Vol. I, page 340.

WORTHINGTON, Thomas, the Younger, and Mulliner, John, both of Manchester, in the County of Lancaster, Small-ware Manufacturers, for their invention of and improvements in the loom or machine used for the purpose of weaving or manufacturing of tape, and such other articles to which the said looms or machines may be applicable. Sealed 21st June, 1825.
No. 80, Vol. XIII, page 192.

WRIGHT, Lemuel Wellman, of Kennington, for an improved combination of machinery for making bricks and tiles. Sealed 1st Nov. 1820.
No. 13, Vol. III, page 23.

—————————— late of Wellclose Square, in the County of Middlesex, but now of Lambeth, in the County of Surrey, Engineer, for his invention of certain combinations of and improvements in machinery for making pins. Sealed 15th May, 1824. No. 53, Vol. IX, page 281.

—————————— for his invention of certain improvements on machinery or apparatus for washing, cleansing, or bleaching of linens, cottons and other fabrics, goods or fibrous substances. Sealed 20th April, 1825. No. 67, Vol. XI, page 225.

—————————— for his invention of a certain improvement in the construction of steam engines. Sealed 21st Oct. 1825.
No. 71, Vol. XII, page [illegible]

To WRIGHT, Richard, of Mount Row, Kent Road, Surrey, Engineer, for his invention of certain improvements in the process of distillation. Sealed 9th Nov. 1821. No. 28, Vol. V, page 180

WYCHERLEY, George, of Whitechurch, in the County of Salop, Saddler, for his new and improved method of making and constructing saddles Sealed 4th Dec. 1824. No. 69, Vol. XI, page 352

YANDAL, James, of Cross Street, in the District of St. John's, Waterloo Road, in the County of Surrey, private person, for his discovery of an improvement or improvements on apparatus for cooling and heating fluids — Sealed 24th August, 1826. No. 78, Vol. XIII, page 65.

YARDLEY, Charles, of Camberwell, Surrey, for a new method of manufacturing glue from bones, by means of steam. Sealed 2d March, 1822. No. 23, Vol. IV, page 236.

YETTS, William, of Great Yarmouth, in the County of Norfolk, Ship Owner, for an invention of certain apparatus to be applied to a windlass. Sealed 28th Feb. 1824. No. 56, Vol. X, page 7.

YOUNG, William Weston, of Newton Nottage, in the County of Glamorgan, Engineer, for his invention of certain improvements in the manufacture of salt, part of which improvements are applicable to other useful purposes — Sealed 4th Dec. 1824. No. 66, Vol XI, page 187.

YOUNG, John, of Wolverhampton, in the County of Stafford, Cooper, for his invention of certain improvements in the construction of locks for doors, and other purposes. Sealed 14th May, 1825. No. 80, Vol. XIII, page 197

ZACHARIAH, Levy, Jun. of Portsea, in the County of Hants, Pawnbroker, for his new invented combination of materials, to be used as fuel Sealed 8th May, 1825. No 83, Vol. XIV, page 35.

THE END.

W. GUTHRIE, PRINTER, 16, SHOE LANE.